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COMMAND AND GENERAL STAFF SCHOOL

MILITARY REVIEW

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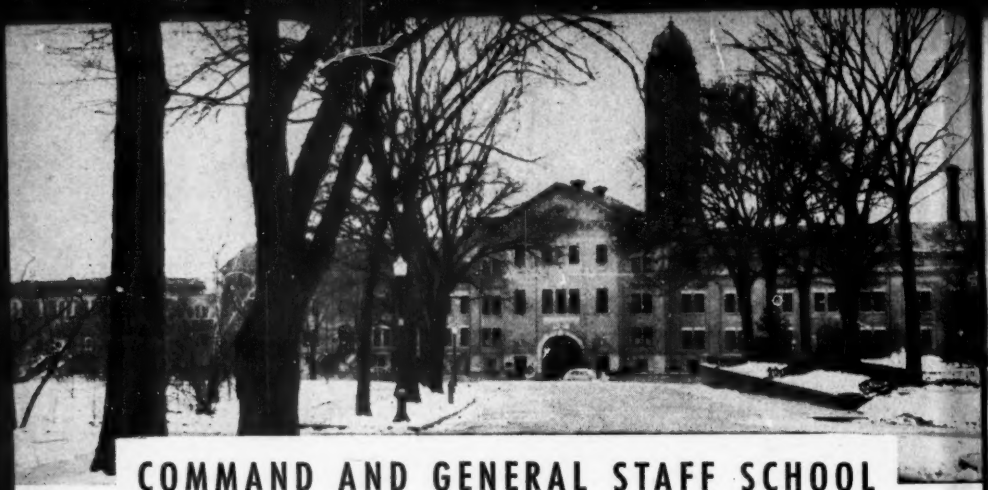

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Assault on Fortified Positions

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THE Allied armies have driven the Krauts and the Japs to earth and now are engaged in the hard task of burning and blasting them from their burrows. We have had considerable practice and some success in this at Saipan, Guam, Salerno, the Hitler Line, Anzio, and on the West Wall. It is, therefore, fitting that we review this subject at this time in order to understand better the current military situation, both in Europe and in the Pacific Ocean area.

This discussion will concern itself with the technique and tactics which have been found successful in overcoming local enemy defensive positions in various places. We will study the technique by which we are able to blast the enemy from our path in selected areas without an excessive loss of manpower in accomplishing this result. It is to be understood that at times the urgency of a situation is such that manpower must be sacrificed for ground in order that the operation as a whole may proceed in accordance with schedule.

General Tactics

On any battlefield there are certain key points of terrain which afford observation of the areas held by the enemy. Sometimes the same area may dominate roads and other lines of communication. At other times it is necessary to seize several terrain features in order that observation may be obtained, and that we may get our guns into position so that we can deny the enemy the use of roads, bridges, towns, and communication centers, without which it is impossible to conduct modern warfare for any length of time. When we have accomplished this, it means that the enemy must retreat from the area as a whole. Therefore, the tactics of assaults on fortified zones makes it necessary, first, to select the key points of the terrain in the zone through which we will carve a hole to the enemy's rear; and, second, to determine the manner in which this is to be done. This discussion will be limited to the technique in which the hole is burned and blasted through the enemy position, with illustrative examples.

Type of Enemy Forts

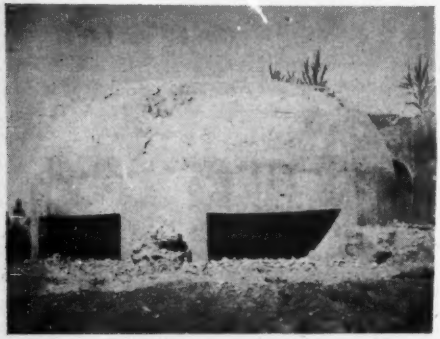
The exact technique which the skilled battle commander employs in the assault on fortified enemy positions will be determined to a very considerable extent by the terrain, weather, the enemy's method of defense, as well as the particular type of forts and field works encountered. These fortifications will vary all the way from a one-man foxhole to an elaborate concrete and steel fort which will support the German battle group; or an

GERMAN PORTABLE STEEL PILLBOXES USED IN ITALY.

elaborate earth and log fort which will cover a Japanese platoon. The Germans at Anzio and other places installed large numbers of two-men steel forts which were buried in the ground until only about eighteen inches of the dome appeared above the surface. This dome was then carefully covered with earth and camouflaged and only the ports with swinging steel doors were left exposed. Even these were camouflaged, so that one of these little forts was extremely difficult to see, even when pointed out. In other places in the

mountains, caves were improved or were blasted out of solid rock. One could always expect that every crest would be fortified by earth and rock barriers which required a direct hit in order to dislodge the occupants unless one used phosphorus shells or fire bombs to burn out the occupants.

In Japanese positions we find much the same type of structures as the Germans use, except that very wide use has been made of



GERMAN CONCRETE AND STEEL PILLBOX ON THE POZZOULI DEFENSE LINE NORTH OF NAPLES, ITALY.

forts buried practically flush with the ground containing log innerworks covered by several feet of earth with additional rocks, logs, or steel eye beams used for a breaker layer. The Japanese have shown a great preference for caves, some of which have been improved from nature but most of which have been dug out as a result of months of hard labor. These caves are usually provided with one or more "S"-shaped entrances which prevent direct fire being brought against the occupants of the cave regardless of the position from which the attacker comes. Within these enemy forts one may expect to find a small battle group armed with mortars, machine guns, machine pistols, hand grenades, antitank mines, rocket projectors, and all other devices suitable for use in defense. In addition to the caves and forts themselves, one can usually expect to find barbed wire, antipersonnel mines, and other defensive devices installed about the perimeter of each individual fort, usually at a range beyond that which can be reached by hand grenades. This is intended to bring the attacker to a halt at a position from which the defenders can open the most effective and deadly fire. In such type of warfare the defenders have every advantage except two. These are maneuver and the initiative. Our assault technique has been developed to exploit these two weaknesses.

ASSAULT TEAMS

Assaults may be made upon a number of mutually supporting field forts at the same time, synchronizing the attack of a number of small teams so that each team assists the other by reducing the efficiency of the fire of the defenders in the particular fort being assaulted. These team assaults may be carried out by a squad or by a company of infantry, sometimes assisted by a few tanks and always supported by mortar and artillery fire. In every case the assault team makes the maximum use of its own weapons which may be moved by individuals during the assault.

The preparation for such an assault usually consists of an artillery bombardment aimed at the destruction of at least a part of the forts in the area and the rupture of communications. The artillery may then move to more distant targets and counterbattery and countermortar missions and heavy mortars manned by chemical troops then fire both HE and WP on all of the individual forts in order to demolish some of the positions, to burn off camouflage, and leave the enemy groggy from blast effect at the time of our assault. The fire of the heavy mortars will lift from the target area at the last moment and a smoke screen will be placed on enemy observation points and upon other supporting forts not being attacked. The infantry assault team jumps forward to the attack from a position near the target at the instant the mortar fire lifts. This is possible because of the extreme accuracy of the American 4.2-inch mortar. When the 4.2 is not available, mortar fire support can be accomplished by massing the 81-mm mortars of an entire infantry regiment in order to support the assault team. When tanks can be used, they are

accompanied by infantry to remove land mines and to furnish protection against outlying defenders in foxholes who otherwise would be able to bring destructive fire to bear on the tanks by the use of bazookas, portable flame throwers, Molotov cocktails, and magnetic mines.

We see from this discussion that the assault on a single pillbox, or upon a group of field forts, must be made with the closest possible cooperation of all arms and each attack must be planned carefully and timed so as to make the maximum use of all weapons available, as well as to exploit the ground occupied by the enemy and our advantage of maneuver.

JAPANESE-TYPE BUNKER CONSTRUCTED AT EDGEWOOD ARSENAL AS AN EXACT DUPLICATE OF A SIMILAR DEFENSE WORK TAKEN BY THE AMERICANS AT BOUGAINVILLE. MORTAR AND MACHINE-GUN EMPLACEMENTS IN LEFT SECTION. SNIPER POSITION IN EDGE OF WOODS. CAPACITY OF FIELD WORK, ONE PLATOON.

WEAPONS FOR USE IN THE CLOSE ASSAULT

The assault group will use whatever weapons are available for the final assault. Generally these weapons will include the heavy and light mortar; the antitank gun; automatic rifles; light machine guns, such as the BAR; hand and rifle grenades, to include frangible incendiaries, white phosphorus, HC smoke, and high explosives; portable flame throwers; tank-mounted flame throwers; Bangalore torpedoes; explosive charges; the bazooka; and sometimes, even ordinary gasoline may be poured into the fort through openings and then set on fire by a flame thrower or WP grenade.

Of the mortars, the 4.2-inch mortar with its heavy shell and large explosive charge (which is equivalent to that contained in two 105-mm howitzer shells) is extremely important in the initial assault and in the defense against enemy counterattacks. The highly portable 60-mm mortar is invaluable in blasting out previously unlocated machine-gun nests. The antitank gun, with its low silhouette, high velocity, and relative ease of movement into position, is extremely valuable in breaking open portholes which otherwise would defeat the infantry assault teams with their grenades and flame throwers. Rifles and light machine guns, which can be moved from place to place, are necessary in order to keep the enemy away from their

portholes until the close-in assault has breached the wire and reached a position from which the enemy can be destroyed. Bangalore torpedoes, or the equivalent, are necessary in order to cut enemy wire and to open up a path through which the final assault on the fort can be made. Consider all these weapons and their bearers as members of the team whose job is to advance the flamethrower man and grenadier to within effective range.

In order to kill the personnel within the protected underground tunnels, or beyond "S"-shaped cave openings, the portable flame thrower is used to burn up the oxygen which sustains life or to destroy the personnel by actual contact with the hot flame. Or WP smoke grenades may be thrown into the fort in order to set up such a blinding smoke that the enemy cannot see how to move within his inclosure. Where a fort has several levels and a large volume of air contained in it, it may be necessary to pour drums of gasoline through any openings that are available, and after the gasoline has had time to percolate throughout the fort, to set it on fire by a blast from a flame thrower or by heaving a WP grenade into the inclosure.

For the final destruction of the fort, high explosive satchel charges, containing as much as fifty pounds of explosives, may be dropped into such openings as have been made into the fort.

General Tactical Plan of Assault

As was stated early in this paper the general tactical plan of the assault is, first, to rupture communications and burn off camouflage in the area to be attacked by air, artillery, and mortar bombardment or such combination of these as is available. Then the area not being attacked by the infantry is brought under artillery and mortar fire to pin the defenders to earth and prevent them from rendering assistance to the area under attack. The assault teams then use their individual weapons as the situation demands to bring a few individuals to within final striking distance of the fort where the defenders are obliterated with the flame thrower, grenades, or explosive charges. Every man in the assault team must understand his part and must be prepared to carry it through on schedule. Such attacks call for teamwork of the highest order. Training for such assaults calls for hard work and lots of it. We will now look at a couple of actual examples.

Anzio.—On the 25th of April, 1944, an assault was made upon a German infantry company occupying a series of supporting pillboxes, trenches, concrete forts, and other field works in a more or less isolated position. The attack was launched both for the purpose of military gain to eliminate the Germans from their troublesome position, and as a morale factor. For some weeks the Germans had been dinning into our ears over the radio the fact that here was a single company which held a position which the whole American 5th Army could not take, and it seemed a necessary operation to restore our own confidence. In training for this operation, a replica of the German position was constructed well back of the lines and the company of infantry selected to take this position was given a week's training until every man was letter perfect as a member of the team. Every weapon available to the infantry was to be used, and a total advance of about one-half mile was to be effected.

As a preliminary operation, the artillery carried out precision fire on every observable defensive works in the area for approximately one hour, and then the heavy 4.2-inch mortars opened up with a tremendous concentration of both high explosive and phosphorus shells while the artillery shifted to other positions. The principal fire of the Germans came from one flank and the chemical mortars shifted to that area to put down a smoke screen mixed with high explosive when the infantry assaulted the position. The entire German company was killed or captured by the use of grenades, rifles, the bazooka, and flame throwers, with relatively small loss to our men.

The success of this operation convinced us that we could take any German position on our front and, at the same time, the German

soldier, who had been led to believe that his defensive positions were invulnerable, knew that he had lost a bit of very valuable ground and one whole company of his comrades. In this case, one company of our own infantry had assaulted a powerful defensive position occupied by a full company of German infantry and had killed or captured the entire German garrison. Our infantry company had been assisted to a considerable extent by a battalion of chemical mortars firing 3,000 shells from thirty-six weapons and seven battalions of field artillery which threw some 10,000 shells during this action.

Saipan.—In the bloody fighting on Saipan, during August 1944, the Japanese occupied a number of similar positions, one of which will be taken as a typical example. This position consisted of a sharp valley heading into the central mountain mass. At the head of the valley the Japs had located a strong concrete and steel pillbox constructed with firing slits from which weapons could cover the entire floor of that valley as well as the approaches on either flank. Along both sidewalls of this canyon there were a number of defended caves with one or more "S"-shaped openings. Our forces could not advance until this position, and many others like it, had been taken. The solution adopted was, first, to smash the heavy concrete and steel fort at the head of the valley by direct fire of medium caliber artillery and observed fire of heavy mortars. Then, while heavy mortars continued to churn up the area directly ahead of our advancing troops, the attackers advanced cave by cave, throwing smoke grenades into the entrance and then blasting each cave with repeated shots from the flame throwers. An additional assault team hit the fort at the head of the valley with a flame-throwing tank flanked and supported by M4 tanks and assault infantry. It was absolutely necessary against these targets to have a weapon which could "shoot around the corner." The flame thrower was the answer to this problem. Teamwork was the key to success.

Conclusions

From the foregoing discussion of the problem, a study of the photographic illustrations, and the examples which have been cited briefly, we see that an assault on a well prepared enemy fortification requires a great deal of ingenuity on the part of the attacking commander and all of his subordinates. Supporting fire on a large scale is necessary with a resultant expenditure of ammunition to an extent never even dreamed of before. Had any student at one of our service schools solved a problem ten years ago in which he supported one company of infantry with a battalion of heavy mortars and seven battalions of field artillery, he would certainly have been given a "U" (Failure), but in our battles today this type of support is commonplace.

We know that there is no easy road to victory. We must have men, airplanes, guns, mortars, ships, and supplies of many types, without stint. Our men must be well trained. Modern battles are won by hard work and teamwork.

One of the commonest mistakes made is to assume that the man you are giving orders to knows as much about what you want as you do yourself. An idea which may have been developing for hours in your own brain will strike him as a completely new thought, and what has taken you hours to think out will, particularly if he has to act quickly, create quite a wrong impression in his mind as to what you want done.

—Maxims and Notes to Junior Officers

Quarter-Ton Cavalry

CAPTAIN JAMES P. BARRY, *Field Artillery*

CAVALRY, the book says, is made up of highly mobile horse, motorized, or mechanized units. Horse cavalry has staged quite a come-back in this war; mechanized cavalry is reasonably familiar; but where is the motorized cavalry?

In power-driven warfare the traditional jobs of cavalry have been handled by various people. Reconnaissance is done by mechanized units. Fire, movement, and the shock action of the charge become the property of armor. There remain several missions which seem to be performed by anyone who happens to be disengaged and who owns some vehicles: infiltration, pursuit, encirclement, harassing, and raiding. In terrain well suited to armor and motors, the movement will be so rapid, and may cover such a wide area, that horse cavalry cannot be used. Armored or motorized infantry is probably employed most often in such situations, and is very useful at times, but infantry carried in half-track or 2½-ton trucks is to a true motorized cavalry what infantry mounted in wagons would be to horse cavalry: flexibility and mobility are nil. Mechanized cavalry is not too useful for such work, for when you leave behind the armored vehicles, which have too little cross-country mobility and are too easily seen for many of these missions, and when you dismount what remains to fight, the force you started with has dwindled to nothing.

Probably the nearest thing to motorized cavalry we have today is the intelligence and reconnaissance platoon of the infantry regiment: twenty-four riflemen mounted in seven quarter-ton vehicles. The platoon is organized to perform one cavalry mission, that of reconnaissance, and is too weak to do much fighting, but a troop made up of such platoons, with additional personnel and automatic weapons, would be capable of giving an enemy commander plenty of headaches. Where roads and trails were at all passable, it could infiltrate, reform behind the enemy, and give him a painful surprise. A squadron of this quarter-ton cavalry, properly trained and armed, would be an ideal unit for the sort of work done by the Russian destroyer battalions, and would be a very unpleasant thing to have prodding your tail or your flank if you were retreating.

The abilities of a squadron of this sort would enable it to appear at an unexpected place, strike, and disperse before the enemy could focus his forces on it; radio control would let the commander assemble it again when he needed it. In other situations it might appear as suddenly, dig in, and hold a position until it was relieved.

To be most effective, such squadrons should receive much the same training as commandos and parachute units, and should have as high a proportion of weapons to men; they would be motorized rather than amphibious or airborne raiders, but once they reach the scene of action, tactics would be much the same, though the cavalry unit would have greater mobility. Each man should be trained to handle any of a number of weapons, so that according to the situation he could "double in brass" as rifleman, gunner, mortar man, or what have you. As in other types of raiding unit, there must be a surplus of weapons. The squadron would need them to be properly flexible: at one time it might fight as an infantry rifle unit; at another it might dig in behind automatic-weapon and mortar fire; or again it might make a close-in attack with submachine guns.

The heavy weapons—heavy machine guns, 60 and 81-mm mortars, and bazookas—and their ammunition, can be easily carried in quarter-ton vehicles and trailers. Towed 37-mm guns might prove valuable, not so much as antitank but as antipersonnel weapons, firing HE and cannister. Light machine guns would be useful on both vehicular and ground mounts; the light automatic weapons developed for airborne units offer a wide selection for motorized units. Our motorized cavalryman would be expert at handling demolitions, and both laying and removing mines,

jobs already familiar to his mechanized brother. He also would receive instruction in simple methods of adjusting artillery fire, so that as long as he was within range of his own artillery he could count on it for support.

Though the primary mission of squadrons of this sort would be battle, they still would be excellent reconnaissance units when it was necessary to fight for the information. During any operation they would be continually gathering material no one else could get, and should be given enough long-range radios so that they could always get the story back to higher headquarters.

Field Manual 21-6

A GOOD lawyer can't quote you all the law or remember too many decisions, but he can without hesitation reach up to the shelf and haul out the appropriate book dealing with a particular question.

So it is with a motor officer in regard to maintenance publications. He should know what technical manuals and bulletins are up to date. It has been learned that many officers are not familiar with authorized maintenance publications and War Department Lubrication Orders covering the equipment of their outfits.

A maintenance officer should be certain that his headquarters has on file the publications that cover equipment pertinent to units.

With the publishing monthly of FM 21-6, War Department Field Manual with lists of training publications, a commanding officer is given at least half a chance to know what is old and what is new in regard to technical manuals and bulletins. FM 21-6 lists Field Manuals, Firing Tables, Lubrication Orders, Mobilization, Training Program, Technical Bulletins, Technical Manuals, and Training Circulars. To be on the ball with up-to-the-minute manuals, you should be sure that this monthly new FM 21-6 reaches you every month.

The purpose of FM 21-6 is to provide as complete as possible the list and index of War Department training publications.

It is noted in the FM 21-6 that the practice of issuing changes in the form of monthly supplements to this manual has been discontinued. FM 21-6 is being published monthly as a recurring manual and includes all changes up to the time of publication. It is like a new telephone directory.

Publications issued during the previous months are indicated in the current FM 21-6 by an asterisk. Hence, it is easy to check your files. Commanders who are responsible for maintaining sets of publications are urged to have them checked periodically against the list of supersessions and recisions which are printed in each monthly issue of FM 21-6.

Maintenance of a file is required of a commander whether the unit is a company or higher echelon. Proper maintenance of a file means having the publications on hand which deal with particular equipment of your unit and keeping these files up to date. Missing manuals or other publications necessary for the upkeep of equipment of a command should be procured without delay from an Adjutant General Depot or other appropriate issuing point.

It is suggested that files be carefully checked and requisitions only for missing copies be sent out. Keeping too many copies of a particular manual will deprive another unit of that manual. Units have been known selfishly to order whole sets of files when they only needed a few copies.

A mechanized war is a fast-changing war in physical position, in models of equipment and in procedures of administration. FM 21-6 in its latest form and with its monthly issue should be a great help in keeping abreast of changes in training publications. (Released by the Director, Maintenance Division, Army Service Forces.)

"We Are Doing What We Can With What We Have"

BRIGADIER GENERAL DWIGHT F. JOHNS
Commandant, The Engineer School, Fort Belvoir, Virginia

THE title that I have used for this article is a direct quote from a public statement made by the Commander in Chief, Southwest Pacific Area, General Douglas MacArthur, in middle or late 1943, and widely used in the press at that time. "We are doing what we can with what we have" was a simple matter-of-fact statement of the drive that was and is being made to make the most effective use of the forces and means available in order to carry on the war against the Japs in that theater. As an officer whose good fortune it was to be assigned to duty in that theater from early in 1942, it may be of interest to point out some of the efforts made to "do what we can with what we have."

I left Washington, D. C., by air on 14 January 1942 under orders to proceed to Melbourne, Australia, and report for duty to the Deputy Commander of the Allied Forces in the Southwest Pacific, Lieutenant General George H. Brett. Upon arrival at Soerabaja, Java, nine days later, I found that Allied Headquarters had been established in Java, and reported for duty there as Chief Engineer, American Forces in Java, and as Director of Works of the Allied Forces. General Brett's first instructions were to provide airfield facilities in Java for two thousand airplanes by June. To an engineer who had arrived but five minutes earlier with nothing but his own two bare hands, that was a spur to start "doing what we can with what we have," right now!

Basically, "what we had" at that place and time was a nearly unlimited amount of native hand labor, Java being the most thickly populated area of its size on the entire earth. There was substantially no construction equipment of the kind we are accustomed to working with in America. Just this teeming island full of human beings! The Netherlands East Indies Army engineers were well accustomed and organized to handle this means of getting work done. It was not unusual to see several thousand little brown Javanese working on an airfield, excavating the "cuts" by hand and loading the material in baskets and carrying it to the "fill" areas on the head or with balancing baskets slung from the two ends of a "pickle" stick over the shoulder. And there in the "fill" areas the earth was tamped into place by other hand workers—women, these, each with a hand tamper, organized in solid close-order formations and advancing and tamping in rhythm to the beat of a drum. In other areas, rock, brought to the worker by hand, by basket, or by narrow-gauge sugar plantation rail equipment, was being broken and placed entirely by small native hands, tamped into place, or possibly rolled by a wheezy, antiquated steam or gasoline-propelled roller.

An outstanding example of what can be done in an emergency with this sort of labor is given in the following incident of those days. Information was received that a squadron of dive bombers had left Australia being flown to Java, that they had been instructed to land on a certain airfield in eastern Java, and that they could not be contacted en route. Could that "certain airfield" receive them! The facts were that this grass field, soggy with rain, could not be depended upon to receive them safely. What to do! These priceless airplanes must not be permitted to crack up after their long movement to this area where they were so badly needed! A telephone call to the American engineer captain in charge of the eastern Java area, and a short discussion with him, brought the decision and directive to cover the sod field with split bamboo matting. A runway 100 feet wide and 3,000 feet long, to be made serviceable for dive bombers in three days with nothing but native hand labor and bamboo still growing in the tree! Could it be done? Suffice it to say that it was done. Twenty thousand little native bodies, working under the direction of an American engineer captain, a Dutch army sergeant, and their

own native "kampoeng" chiefs, cutting bamboo from where it was growing, often many miles away, splitting it, weaving it into mats approximately two meters by three meters, carrying the mats to the field, placing and fastening them, and then covering them with a layer of sand, resulted in a usable runway which took the planes as they arrived.

Mention of the engineer captain in the incident recited above brings to mind another example of using "what we had." A few days before, this captain had been an American civilian, refugee from Sumatra where he had been a valued employee of an American oil company. Many other such patriotic Americans driven out of their far-flung fields of endeavor in Malaya, Borneo, Sumatra, and other Netherlands East Indies islands were quickly transformed into commissioned officers, most valuable for some of the work to be done in that area whose ways were new and strange to most of us Occidentals. Let it be known that these people did yeoman service there under those conditions and have continued to justify the confidence placed in them by commissioning them. Let their kind be remembered in the future for similar utilization.

Doing what we could with what we had did not suffice to stop the southward advance of the yellow aggressor. The heroic efforts of the available American, English, and Dutch navy elements; the few sturdy B-17's and B-24's, Hudsons, and P-40's; and the Netherlands East Indies Army, supported by an American field artillery battalion, all took their toll of the Jap, but it was far from enough to stop him, and the scene of our efforts is shifted to the southeast—far to the southeast—on the great island continent of Australia.

There, vastly different conditions present a vastly different problem of how to get things done. Instead of being thickly populated, with unlimited manpower resources, manpower is extremely limited and already stretched to the elastic limit to meet this little Commonwealth's commitments to its Army, and to its munitions manufacturing program. Construction equipment, also measured in terms we are familiar with in America, was scarce. So here, again, was another problem of how to get the most out of what we had. To accomplish this, and to effect the maximum of coordination in the employment of the means available of manpower, equipment, and materials, there was created by the Government of Australia, with the concurrence of the Commanding General, United States Army Forces in Australia, an Allied Works Council, under the head of a Director-General of Allied Works in the person of a strong, dynamic Australian civilian, Mr. E. G. Theodore. This Allied Works Council was composed of the Director-General, an Assistant Director-General who was the Director-General of Works in the Department of Interior of the Commonwealth of Australia, the author as Chief Engineer of the United States Army Forces in Australia, and representatives of the Australian Army and Air Force. The basic function of this Allied Works Council was the carrying out of all works of whatever nature required for war purposes by Allied Forces in Australia. This, of course, included the securing of supplies, of materials, plant, tools, and equipment for the purposes of these works, and the employment, transportation, housing, and feeding of all workmen therefor. To establish the order of priority of all the various and sundry works required, a Priorities Sub-Committee of the Chiefs of Staff Committee was set up. This consisted of appropriate representatives of all interested agencies, including three from the United States Army Forces in Australia. Once a priority was accorded a project by this sub-committee, and approved by the Chiefs of Staff Committee, the Allied Works Council took over the prosecution of the work with full powers to do whatever necessary, within the means available, to get it done. These powers included powers to establish a Civil Construction Corps, to impress any plant or equipment, and to use all existing constructional agencies such as the Department of

the Interior of the Commonwealth, the State Roads Boards, and other State Government and semi-Government works organizations, contractors, and sub-contractors. With the Army, the Navy, the Air Force, and the munitions projects, and with two nations involved in the urgent need for construction

FIGURE 1.

work with limited resources, the Allied Works Council accomplished a very important job of coordination, control, and execution through at least two years, 1942 and 1943.

Some of the more prominent types of projects carried out in this manner by the Allied Works Council, or through its coordinating agency, were camps and training areas, roads, hospitals, depot buildings and warehouses, headquarter offices, port structures, airfields and air depots, naval structures including dry docks, and munitions plants and appurtenant structures. Specific items that may be mentioned are the north-south road across the middle of the continent from railhead at Alice Springs to Darwin with a connecting east-west road from railhead at Mt. Isa, airfields and large aircraft depots and maintenance plants in Victoria and Queensland, divisional staging camps and training areas in Victoria, South Australia, and Queensland, and large hospital installations in New South Wales and Queensland. All of these are the product of the coordination of several agencies, military and civilian, effected through the agency of or with the help of the Allied Works Council.

Another example of making the maximum use of available means was shown in the dispatch of the first three American Army Engineer units, one aviation engineer battalion and two general service regiments, to northern Queensland and Northern Territory to do all necessary construction work, primarily airfields and appurtenant installations. Since it was necessary to assign work to these organizations far beyond the capacity of their normal equipment (this has more particular

FIGURE 2.

reference to the general service regiments) it was necessary to resort to requisitioning of additional equipment such as tractors, graders, and trucks from the farming areas of northern Queensland. This was done largely through the agency and authority of the Director-General of Allied Works, under his broad powers conferred by National Security Regulations. Thus supplemented, these units were able to turn out an astounding amount of work in road and runway construction. Some of these roads and air landing strips in Northern Territory and Queensland are shown in Figures 1 to 4.

An interesting example of hospital construction early in 1942 provided a thoroughly usable hospital of several hundred bed capacity at Townsville, Queensland, with the very limited construction materials available there at that time. Due to the Japanese threat, many civilians were moving farther south in Australia, leaving houses vacant in

northern Queensland towns. By arranging through Australian Army "hirings" authorities for shifting some of the remaining occupants, a consolidated area of Queensland bungalow-type houses covering a street length of two blocks, on both sides of the street, was provided. The addition of some

FIGURE 3.

utilities, special hospital facilities, walkways at main-floor level, and ramps were necessary, provided a hospital with small consumption of construction labor and materials, and what was of equal importance, in the minimum of time.

In the program of providing air landing strips as rapidly as possible in northern Queensland early in 1942, use was made of several types of construction by several types of agencies. As a result of this fact, airfield facilities for our heavy and medium bombers were provided in sufficient quantity and suitable location to enable the Battle of the Coral Sea to be fought as it was and the southward advance of the Japs to be stayed. Some of these fields were of more or less standard type construction, drainage, and surfacing. Others, however, were rapidly cleared and graded, and surfaced by utilizing available local material. For one, we were particularly fortunate to have the first pierced steel plank produced in quantity. This particular plank had been procured for service test, and had been the surface for an airfield constructed by the 21st Engineers (Aviation) under command of the author during the 1941 maneuvers at Marston, N. C. At the end of the maneuvers, this plank was taken up and packed for shipment, and after Pearl Harbor

FIGURE 4.

it was shipped to Australia where it arrived in time to be used at one of these northern Queensland fields in April 1942. It was landed at Townsville, railed some 200 miles inland,

FIGURE 5.

and placed by a company of an American general service regiment in record time, although these troops had never before seen anything like it. There, in Australia in April 1942, I landed on the same steel planks on which I had landed in North Carolina in November of 1941. Figure 5 shows this fine pierced steel plank field in Australia.

In order to make the maximum use of construction material, even to scrap lumber, a type of wooden arch was developed by a

civilian employee of the Chief Engineer, U.S. Army Forces in Australia, which could be built in a number of different sizes. Once a template for a particular sized arch was laid out, it could be built rapidly by unskilled

FIGURE 6.

labor. These arches were used for a number of purposes, but primarily for small plane camouflage net supports, hangars, and ware-

FIGURE 7.

houses. These last were built in this manner up to eighty feet span of the arch. By adding successive arches, a building of any desired length could, of course, be provided. Figures 6, 7, and 8 show some of the smaller of these arches, the sections shown on the truck and ground being half of one arch.

Leaving the mainland of Australia and looking into operations in New Guinea, one of the first and foremost illustrations of "doing what we could with what we had" in the construction field was the means taken to expand the wharf facilities at Port Moresby, Papua. The existing wharf could accommodate one ship (Liberty type) at a time. It could be extended only if piling and heavy timber could be obtained. None was available locally and to obtain and ship from Australia was a matter of several weeks' time. Additional facilities were badly needed *now*,

FIGURE 8.

if not sooner! The problem must be solved at once with the means at hand. There were a limited number of engineer troops of a general service regiment, with earth-moving equipment and dump trucks (all suffering from overwork and inadequate maintenance), all the earth that was necessary, and a limited number of heavy wooden barges or pontoons which had been built in Australia and sent to Port Moresby to assist in lighterage. Another limitation was the fact that coral reefs and ledges practically surrounded the harbor and new locations for a wharf were very limited. Suffice it to say that the resourcefulness, initiative, and drive of the American engineer solved the problem. An island in the harbor had relatively deep water near one section of its shoreline. In fact, this was the only place in the harbor suitable for another wharf. Depths of water between the mainland and the island were shallow—over coral-reef bottom. The tidal range was low. The "approved" or adopted solution was to build an earth causeway connecting the mainland to the island, about two miles of road on the mainland to the

causeway, about one-half mile of road along the island from the causeway to the wharf site, and causeway approaches to a floating wharf constructed of wooden pontoons joined and decked with heavy timber stringers and planking. Figures 9 and 10 show the essential details of the scheme. It worked! And substantially increased the discharge capacity of the port at a time when it was critically needed. And it was done on a shoestring, so

FIGURE 9.
(SIGNAL CORPS PHOTO.)

to speak—the material immediately available!

Another example of maximum use of what we had which should not escape a place in such a discussion as this was a miscellaneous assortment of small craft used to supply and maintain water communication with the north coast of New Guinea from Port Moresby and Milne Bay during and following the Buna campaign until a port could be provided at Oro Bay. This assortment varied all the way from powered seine-trawlers of about fifteen tons capacity picked up along the Australian coasts as far south as Victoria to fair vessels of 1,000 to 1,500 tons capacity taken off the coastal runs—Diesel or steam powered. These were all acquired, repaired, crewed, and provisioned by the Transportation Service of USASOS, SWPA [United States Army Services of Supply, Southwest Pacific Area]. Most of the crews were Australian civilians, later supplemented or replaced by American civilians from the United States. To this "small ship section," as it was designated, must go a considerable part of the credit for the support of the troops fighting at Buna. It was especially mentioned by Lieutenant General Sir Edmund F. Herring, GOC [General Officer Commanding], New Guinea Force, in his Order of the Day

FIGURE 10.
(SIGNAL CORPS PHOTO.)

on Completion of the Recapture of Buna-Gona Area in that he thanked the "small boat section that has braved hazardous waters and enemy action in getting supplies up the coast."

To better effect the utilization of "what we had" by way of service elements of both the American and Australian services in the Buna campaign, the Commander in Chief, Southwest Pacific Area, created a Combined (American and Australian) Operation Service Command (COSC) for New Guinea. This was organized and commanded by the author, with headquarters and main base at Port Moresby. An Australian brigadier was assigned as Deputy Commander of COSC. This Command was responsible for all "communications zone" supply, construction, transportation, evacuation, hospitalization, and sanitation in New Guinea for both American and Australian nationalities. It had the responsibility—and the authority—to get the maximum utilization out of what means were available. The commander of COSC had the authority, with the approval of the GOC New Guinea Force, to call on the local com-

manders of the Allied Ground Forces, Air Forces, Naval Forces, or United States Army Services of Supply for such means as were available to assist in meeting any service problem. GHQ directive provided that such local commander, when so called upon, "will furnish." Therein lay the authority of COSC.

The specific subjects cited above are but a very few illustrations of using what was available to the best advantage. Complete analysis is impossible at this time. Other illustrations would go into all aspects of activity in the theater, combat as well as service.

Bombs Away!

Digested at the Command and General Staff School from an article by Brigadier General R. C. Coupland in *Army Ordnance* November-December 1944.

TODAY, even though we are utilizing all resources and facilities to the maximum extent, we are scarcely able to keep pace with extraordinarily high bomb expenditures. Our records show that the Air Forces dropped twice as many tons of bombs during the first six months of 1944 as in the entire period from Pearl Harbor to 31 December 1943. During the latter half of 1944 our bomb requirements are in excess of 700,000 tons. The total tonnage of bombs dropped in all theaters of operation from Pearl Harbor to 1 July 1944, amounted to 677,012 tons, of which 472,054 tons were dropped during the period from 1 January through 30 June.

Our logistical requirements for aerial bombs were greatly revised during the past summer. In the European theater of operations, for example, following the intensification of air war on all Nazi industrial targets, there was a 500 percent increase in the tonnage of bombs dropped between January and June, with an over-all of 405,212 tons for the six-month period. Of this total, 243,402 tons were dropped by the Eighth and Ninth Air Forces operating from England and the beachhead in Normandy.

As an indication of the intensification of bombing activity preceding the liberation of France, American aircraft based in Great Britain dropped 14,105 tons of bombs on German installations in January. This tonnage steadily increased until June, D-month, when 85,648 tons of bombs, or more than five times the January total, were showered on German industrial and military targets. In addition, the Twelfth and Fifteenth Air Forces in the Mediterranean theater steadily intensified the airborne punishment inflicted on the enemy until, by the end of D-month, they had cascaded a total of 161,810 tons of bombs on German installations.

Bomb expenditures for the South, Southwest, and Central Pacific have been negligible by comparison with the European theater. For the first seven months of 1944, a total of 66,568 tons were dropped in all three areas. It should be noted, however, that the majority of targets in these areas were and are tactical, and that far fewer bombs were required to destroy shipping, troop, and supply concentrations than were needed to eliminate the industrial sections of German cities.

Even in the Pacific area, bomb requirements, although relatively small, skyrocketed in 1944. A breakdown shows that in the Southwest Pacific, 22,410 tons of bombs were dropped in 1943 and 39,882 tons during the first seven months of 1944—a 200 percent increase. In the South Pacific, 7,644 tons were expended in 1943 and 17,397 tons from January through July 1944—an increase of 300 percent. In the Central Pacific, where a unique situation existed, only 1,309 tons were dropped in 1943, as contrasted with a requirement for 9,289 tons for seven months of 1944—an increase of 1,200 percent.

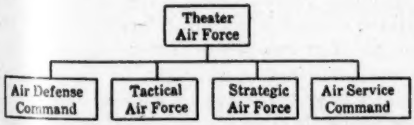
Air Force Signal Communication

LIEUTENANT COLONEL STEVE GADLER, *Air Corps*
Former Instructor, Command and General Staff School

GENERAL Montgomery has said, "The greatest asset of air power is its flexibility, and this enables it to be switched quickly from one objective to another in a theater of operations. So long as this is realized, then the whole weight of the available air power can be used in selected areas in turn; this concentrated use of the air striking force is a battle-winning factor of the first importance." The great asset of air power, flexibility, is made possible through the proper employment of the available signal channels.

Consider the vast areas and distances comprising thousands of miles involved in the operations of the Fifth Air Force in the Southwest Pacific, fundamentally a water area; or the far-flung outposts of the Tenth and Fourteenth Air Forces operating in the China-Burma-India Theater, a land area; or of the Eighth, Ninth, Twelfth, and Fifteenth Air Forces ranging over Europe from Norway to Bulgaria from bases in England and Italy. Then and only then will the realization as to the immensity and complexity of the signal requirements for these air forces be fully appreciated. The signal task is prodigious, complex, and sometimes staggering to the imagination.

The Army Air Forces is composed of fifteen Air Forces, eleven of which are operating outside the continental limits of the United States. It is in fact a global organization operating in almost every war front and theater. A theater Air Force may be composed of all or part of the components appearing on the organizational diagram below.



Three of these components comprise tactical air organizations. Each of the three components is further subdivided into wings, groups, and squadrons.

The signal channels required for the Army Air Forces may be grouped for our purpose into Command, Liaison, Aircraft Warning, Navigation Aids, Combat Aids, Weather, Supply, and Intelligence.

Command.—Command channels are employed for command purposes and are required by an air force along the axis of its command. Thus the theater air commander in the Southwest Pacific must have direct signal channels to each of his subordinate commands, and each of these commands must in turn have channels to all of its subordinate units. These channels are used for issuing orders; consequently they must be reliable and infallible. Likewise, to order a thousand planes of the Eighth Air Force for a bombing mission over Germany obviously requires a vast signal network to transmit the necessary orders to all the subordinate wings and groups and in turn to all squadrons. Also to be kept in mind is the fact that the air squadrons, for an operation of this type, may be based over all of England.

The aircraft controller in air defense operations requires direct channels to the units assigned for air defense so that he may order one squadron or an entire group into the air for intercepting enemy planes. He requires these lines for the same reason an artillery commander requires fire-control lines to his batteries. Enemy bombers approaching the same vital coast military installation at 250 or 300 miles an hour necessitate immediate action by the controller. He must utilize every second to get airborne the squadrons assigned to air defense, for obviously time is the important element; and signal channels available for this purpose and employed by the controller must not fail.

When the planes become airborne and are on an assigned mission over Jap-held Rabaul or New Britain Island or over German-held territory in Italy, command channels must be available to the air commanders for air-

to-ground and air-to-air signal communication. These channels employing radio are particularly essential in the control of fighter aircraft on intercept missions or in close cooperative efforts with ground troops.

Missions for long-range bombardment aircraft deep into the heart of Germany are assigned before the aircraft armada leaves the ground, and when airborne, the commander in the air, if necessity arises, employs his air-to-air channels for command purposes. Obviously, it is also necessary to provide command channels within the airplanes. The pilot of a heavy bomber must be able to communicate with the tail gunner or with the navigator or the bombardier. A humorous story from the Eighth Air Force tells how a pilot of a heavy bomber finally met his tail gunner after their plane had completed many missions over Germany, although they had been in constant signal communication on these bombing missions over Europe. Far fetched perhaps, but the little oddity serves to emphasize the importance of command channels within the airplanes.

Liaison.—Liaison channels are necessary in joint air, ground, and naval operations carried on against the enemy, as for example in the Sicilian invasion. Air-to-air liaison channels also are necessary when fighters cover and protect Eighth Air Force bombers on missions over Europe. Further, in ground, naval, and air operations in the Southwest Pacific, liaison is necessary between the respective commanders and between the theater commander and the various Allied headquarters.

The needs for liaison channels by the Air Forces are innumerable. Suffice it to say, it was, in the opinion of many, direct liaison channels between Marshal Coningham and General Doolittle, the commanders of the Strategical and Tactical Air Forces in the African campaign who had been authorized to reinforce each other, that contributed so much to the defeat of the Axis air power and to the final Axis collapse. At a moment's notice, either one of these commanders could call upon the other for assistance.

Aircraft Warning.—Air defense is necessary especially when our installations are within range of the enemy aircraft. The Aircraft Warning System is the agency employed by the Air Defense Command to collect and correlate information on all aircraft flying in the air defense area or approaching the area. After the information is collected it must be evaluated, and the evaluated information or intelligence must be disseminated. Channels of communication must be provided to the ground observers and other agencies for transmission of information to the filter centers, and for the dissemination by the filter center of the evaluated information or intelligence.

The losses of friendly planes and men shot down by our own forces during the Sicilian invasion clearly emphasize the need for separate channels of signal communication. Furnishing separate channels of communication for identification purposes sounds like a solution, but the problem is not quite that simple. The planes of many allies may be operating in any given area, and the ground and naval forces of the same allies may also be operating in that same area. To this difficulty, add night operation and the barrier of many languages, and the problem becomes complex and complicated, yet provision for separate radio channels for identification can help to solve the problem along with other methods that may be employed, such as the use of visual signals and a predetermined code.

Navigation Aids.—A small island atoll in the Southwest Pacific was chosen as an advance airfield upon which was based a light bombardment squadron with the mission of destroying enemy installations hundreds of miles to the north. The atoll was in reality only a speck in the vast expanse of the surrounding Pacific Ocean. The squadron operated in good and bad weather, yet the pilots, after completion of their assigned missions, returned unerringly to their small island base by means of a radio beacon installed on the atoll.

Pilots negotiating the most hazardous flying route in the world over the Himalayas

depend on various types of radio navigation aids to bring their planes safely into China. Almost all aids to navigation are radio devices operating on radio frequencies assigned and allocated to provide the necessary channels. These instruments are not glamorous, but on their accuracy often depend the lives of the men who use them and the fate of entire missions.

The duty of the navigator is to give the pilot his location and directions to enable the plane to reach its objective, carry out its missions, and then return safely to home base. The navigator depends for his information on various types of instruments, some of which are important radio devices.

"Mickey Finn," a Flying Fortress, was once ordered to attack an Axis convoy in the Mediterranean between Crete and Benghazi. The convoy was located and the bombs were unloaded to good effect. Meanwhile, it had begun to cloud up and poor visibility prevented flying by dead reckoning. "With our fuel supply getting lower and lower," writes the navigator of "Mickey Finn," "we continued to cruise around in the soup looking for a way out. And then our radio operator contacted the home station. With the radio compass pointing the way, we got back on our course. It was blind flying all the way home, but we made it—thanks to our radio and radio compass."

Combat Aids.—Channels must be provided for the various types of combat aids utilized in air operations. For instance, some method must be employed to mark the bomb line for the aircraft operating in close support of ground troops or to direct night fighters within the immediate vicinity of the oncoming enemy planes. Whatever aid is employed, signal channels may be necessary, and if so, must be provided. All radio communication must have frequencies assignments to insure clear channels.

Weather.—Since air operations depend on weather information, it is of the utmost importance that provision be made for the regular flow of weather reports and forecasts. The weather officer must obtain his weather information from all available sources and then send it to all operational units. In some theaters regular channels may be provided. In others, however, weather information will have priorities on the existing signal channels. On an air operation over Europe it is necessary to know the weather conditions to be encountered while flying to the target, and probable visibility at the target. Many squadrons upon a return mission have had to land at other fields due to fog closing in the home base.

Supply.—The problem of logistics for the air forces is enormous, since in some operations supply is entirely by air. The Air Service Command, which handles all supply and supply installations for the Air Forces, needs and is provided with the necessary signal channels to fulfil the mission of supply.

Intelligence.—Operational plans are based on intelligence of the enemy's dispositions, his strength, and the location of his airdromes. To obtain this information requires signal channels. All returning pilots, for example, after the completion of a mission over the enemy-held part of New Guinea, are interrogated by the individual squadrons' S-2's and the information obtained is sent forward to A-2 who in turn evaluates this information, and A-3 can then use the intelligence to plan other operations.

To operate efficiently, to control effectively, to coordinate properly, and to obtain flexibility, Air Force commanders must rely on modern signal communication to overcome factors of time and space.

German patrols are not exceptional, but they are consistently aggressive. Their better patrols are no better than our better patrols, but they do not seem to have any poor patrols.

—An Assistant G-2 of an American division

Second Battle of Bougainville

MAJOR REGINALD S. JACKSON
Press Relations Officer, XIV Corps

PRELUDE

THE I Marine Amphibious Corps, major units of which were the 3d Marine Division and the 37th Infantry Army Division, made the initial landings in Empress Augusta Bay, Bougainville, Solomon Islands, early in November 1943. The Marines had gone in on the first, followed by the 37th, first elements of which arrived on the eighth.

The Japanese had fought against these landings with an estimated two companies which were annihilated on the beaches by the Marines, and with spasmodic air strikes which were ineffective.

On the sea, four Japanese heavy cruisers and eight destroyers left Rabaul in New Britain on 1 November, apparently to contest the American invasion. This force retired to the north when a task force under Rear Admiral Aaron Merrill attempted to bring about a fight. The next morning three enemy forces of four ships each were contacted and attacked. We damaged at least one cruiser and possibly some destroyers before the enemy withdrew from action. Our damage was light.

On 7 November a force of Japanese sent down from Rabaul, estimated at 500, landed on both sides of the Laruma River, which generally marks the northern or left extreme of the beachhead (see Figure 1). Marine artillery and mortar fire annihilated this group.

Later in November the 37th Division, which occupied half the corps sector, moved to its final defense line without incident. The Marines in their occupation of their final defense line ran into two battalions of Japanese with artillery emplaced on Hills 600 and 1,000, several hundred yards in front of the ultimate Marine positions. The Marines suffered an estimated 300 casualties but managed to disengage themselves and withdraw to positions of safety. The next day the entire corps artillery fired upon the Japanese concentrations, and 1,143 enemy bodies were counted after the Japanese retreated from the murderous barrage.

During November, December, and first part of January, Japanese planes were over the beachhead nightly in nuisance raids which caused some damage.

Major General O. W. Griswold, commander of the XIV Corps, assumed command of the Bougainville occupation on 15 December 1943, and the Americal (correct) Infantry Division, Guadalcanal veterans then commanded by Major General John R. Hodge, come in to relieve the Marines.

In an effort to dislodge entrenched enemy from positions across the mouth of the Torokina River, which generally marks the southern and eastern extreme of the beachhead, a coordinated artillery-tank-infantry attack was begun on 30 January 1944. Supported by 4.2-inch mortars, the attack was successful in destroying twenty pillboxes and eighty of the enemy. The assault was strongly contested, and United States forces had one tank disabled by fire and another mired in a swamp. The latter was stripped and abandoned.

Patrol activity continued throughout the early part of February, and it was discovered that enemy reconnaissance was becoming more vigorous.

Intelligence disclosed later in the month that the Japanese were moving in in great numbers east of the American beachhead and were engaged in establishing semi-permanent supply dumps, evacuation hospitals, and command posts. Enemy troops were identified as the 17th Army, of which the Sixth Imperial Japanese Infantry Division is a part. It was this division which became notorious for its participation in the rape of the Chinese city of Nanking in 1937.

Thus the stage was set for the second battle of Bougainville.

THE SECOND BATTLE

Early on 8 March, approximately 400 enemy 75-mm and 15-cm shells were fired on the Torokina airfield and the two strips of the Piva airfield. It was the largest concentration of Japanese artillery anywhere in bat-

tles in the Solomon Islands. This heralded the general attack.

At 11:30 PM the same day, the Japanese assaulted Hill 700 in the 37th Division sector (see Figure 1). Hill 700 is the commanding ground in the Empress Augusta Bay area, and indications later revealed that the enemy's strategy was to take the hill and from this place, with his 90-mm mortars and 75-mm guns, to deny the two Piva strips to our aircraft. With this cover, the enemy's grand plan included a breakthrough of the lines of Major General Robert S. Beightler's 37th Division nearest the Piva airfields. At the contemplated point selected for the penetration the distance to the fields was barely half a mile.

Attacking in closely massed formation on a front fifty yards wide, large numbers of the enemy were killed as they surged up the steep slopes leading to the crest of Hill 700. However, some Japanese managed to reach positions in a saddle just below the crest of Hill 700 within our lines, and to construct five pillboxes and occupy three of ours.

A counterattack by United States troops at 6:00 AM, three hours after the enemy had made the penetration, met with little success. On 11 March another counterattack was launched with the same results.

At 7:30 AM on 12 March a third counterattack was begun, and by 1:55 PM of that day the Japanese intruders had been ejected and survivors of the enemy regiment which had assaulted the hill withdrew toward the north-west. During the fight, every infantry weapon up to and including the 37-mm gun had been used against the Japanese attack. In addition to these, antiaircraft artillery emplaced on the hill to guard against aircraft had been used with good effect at point-blank range, and for direct counterbattery. Artillery, including 155-mm guns, had continuously hurled tons of high explosives into rear Japanese assembly areas, and after the fight the jungle foliage before the lines had been devastated. The Japanese left 1,173 bodies on Hill 700.

In an apparent effort to divert our troops from other defense areas, a battalion of the

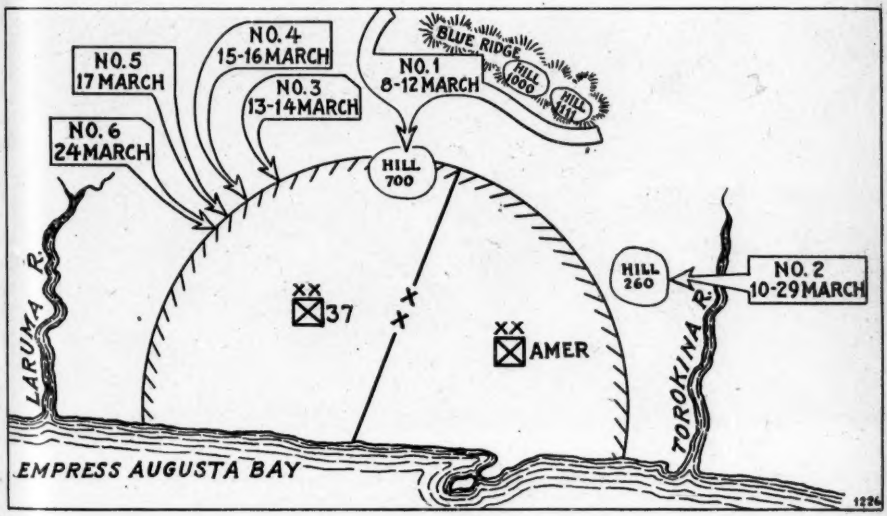


FIGURE 1.

PLAN SHOWING ATTACKS MADE AGAINST XIV ARMY CORPS BY THE 17TH JAPANESE IMPERIAL ARMY, MARCH 1944.

13th Infantry Regiment of the Sixth Japanese Division had, on 10 March, attacked Hill 260 in the Americal (correct) sector and seized the forward nose of the hill. A huge banyan tree which had served as an artillery observation post was surrounded and the roots of this tree were used as a basis for extremely strong entrenchments. Observers stationed in the tree at the time of the attack, an officer and an enlisted man, were killed. Occupation of this tree and the ground around it enabled the enemy to hold parts of the hill until 29 March when Americal units, after using flame throwers, grenades, small arms, bazookas, 37-mm guns, and 105-mm howitzers, were able to eject him and regain the hill. Americal troops killed 541 Japanese on Hill 260.

FIGURE 2.

BOUGAINVILLE, MARCH 1944. INFANTRYMEN OF THE 37TH (BUCKEYE) INFANTRY DIVISION ALERT FOR SNIPERS AS THE GENERAL SHERMAN MEDIUM TANK WAITS FOR TARGETS OF OPPORTUNITY. (SIGNAL CORPS PHOTO.)

The third of the series of the six separate assaults came in the 37th Division sector. It furnished a pattern to be followed by the remaining enemy efforts to penetrate our lines and capture the vital Piva strips.

In the early morning darkness of 13 March, the enemy began infiltrating through the wires and around the front-line pillboxes of a battalion holding a part of the sector of the 37th Division. The remaining three attacks were also to be made against this battalion, reinforced later, however, by other units of its regiment and combat engineers.

By daylight the Japanese had succeeded in penetrating the lines and had set up a defensive area roughly 100 by 100 yards. Three tank attacks a few hours later failed to dislodge the enemy, but a fourth tank offensive the next morning so pinned down the enemy that our infantry troops moved in and mopped up in the afternoon. Three hundred enemy dead were counted.

Early on 15 March the enemy attacked again just as he had two days before. He set up a defensive area within our wires, but a coordinated infantry-tank action the next day expelled him, and 200 enemy dead were strewn about the battlefield. Unable to use the land mines they carried and their 75-mm guns against the tanks, the Japanese nevertheless scored a minor success when at one point during the fight snipers knocked the periscopes off the four medium and three light tanks which were engaged in the fight. The tanks, blinded, were forced to retire.

The fifth attack by the Japanese, 17 March, was a light push which was able to penetrate the main line of resistance, but this was met

by tanks and infantry and 195 of the enemy were slain. In this battle area, United States troops had not completed burial of Japanese bodies from the day before when the attack started. Many of the Nips had burrowed into the fresh graves of their erstwhile comrades to construct their shelters.

Following a lull of six days, the Japanese made their sixth and final attack in the same battalion area on 24 March. But this time they modified their tactics somewhat and bypassed pillboxes on the front line to make a penetration of 300 yards, the deepest penetration in all the fighting. The fire fight took place in the battalion command post. The Japanese had taken over three pyramidal tents of the headquarters. The attack was broken shortly before noon with a cost to the Japanese of more than 200 killed.

The next day a Fijian combat patrol detected the massing of the shattered remnants of the 17th Army outside the lines of the adjacent battalion sector to the north and west. All artillery on the island, except one battalion of 155-mm howitzers which was held for counterbattery, fired into the area. A total of 5,000 shells weighing approximately 115 tons was concentrated in an aera 2,000 by 2,800 yards, and this thoroughly broke up the impending last desperate attack. Later that day, torn remnants of the 17th Army began a ragged withdrawal to the south and east. The Second Battle of Bougainville was over. A total of 6,843 enemy dead were accounted for during the battle. These were either buried by our troops or their graves discovered. Because of the tremendous number of artillery shells fired back into unpatrolled jungles, the obliteration of bodies by this fire, undiscovered Japanese graves, and enemy wounded who later died, it is estimated that approximately 9,000 of the enemy were killed. The Japanese had paid a high price for a futile attack against the American beachhead. The ratio of dead was thirty of the enemy slain for every American killed.

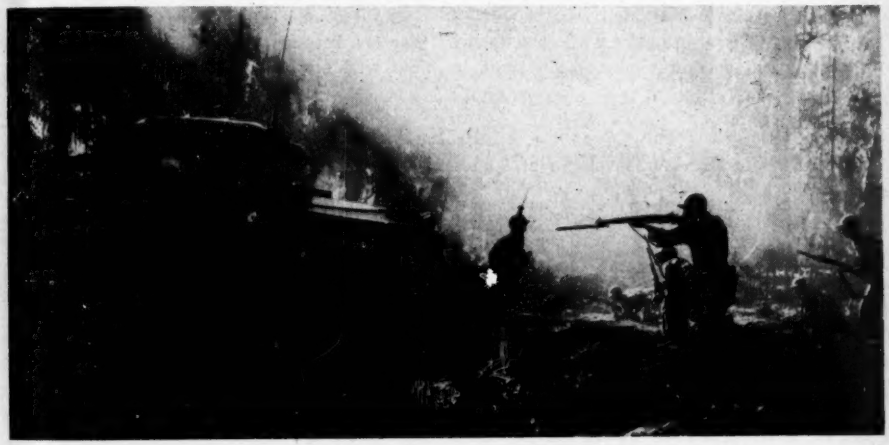


FIGURE 3.

BOUGAINVILLE, MARCH 1944. A TANK ADVANCING THROUGH THE JUNGLE WITH INFANTRYMEN FOLLOWING IN ITS COVER. (SIGNAL CORPS PHOTO.)

There were several notable conclusions apparent during the battle:

1. Tanks are effective in jungle warfare. In close fighting which dominated the battle, tanks were used in two ways, firstly as mobile pillboxes, and secondly as cover for advancing infantry (see Figures 2 and 3). In the latter instance, the tanks also were used to shield

aidmen evacuating field wounded. To qualify this conclusion, however, no swamps were encountered sufficient to bog down the tanks.

2. Antiaircraft fire can be used with deadly point-blank accuracy against pillboxes. When used on ground targets, it becomes pinpoint accurate, and also combines a shotgun effect. The 90-mm guns proved to be excellent for direct-fire counterbattery.

3. It is better to stay in pillboxes during the night and early morning while the enemy infiltrates and wait until broad daylight to counterattack, since our fire power is far superior to that of the Japanese.

4. All artillery emplaced within a beachhead like the one in Empress Augusta Bay, which was four miles deep from the center of the arc of the perimeter to the beach and included sixteen miles of front, can be massed on any remunerative target beyond the lines in a few minutes.

5. Despite the effectiveness of tanks, artillery, and aircraft, the sole way to get the Japanese out of his holes and pillboxes is for the infantryman to go in and "dig" him out with small-arms fire and bayonets.

U. S. Rockets

From "Rocket Development," an article in *The Coast Artillery Journal* November-December 1944.

MOST widely used U. S. rockets today are the Army's bazooka rocket and the 4.5-inch M8 projectile. The original bazooka, produced by Army Ordnance and NDRC in the spring of 1942 after a full year of experimentation, was a 54-inch tube with a handgrip and a simple battery attachment which ignited the rocket. The bazooka's length made it unwieldy in the jungle, so the folding bazooka, a 61-inch tube which breaks down into two parts for greater ease in carrying, was developed. The bazooka can be operated by one man, but the usual team is two, a loader and a firer.

The bazooka was developed primarily for antitank use. It fires a 2.36-inch projectile, highly effective against armor. Bazooka teams have knocked out even the giant German Tiger tanks. In one case a GI bazooka man blew the turret off a Nazi tank from seventy-five yards. In a single day of fighting, two-thirds of a German panzer force was knocked out or damaged by bazooka teams and aircraft rockets.

The bazooka rockets themselves do not penetrate armor, but punch a hole through thick steel plate by a terrific concentrated and directed blast effect that throws hot fragments of steel around inside the tank. In some cases, rockets have blasted as much as six inches of armor plate.

The 4.5-inch rocket, launched from planes and vehicles, is the most widely used of the medium-caliber rockets. The 4.5 has an explosive effect equivalent to that of a shell from a 105-mm howitzer; yet it may be launched from a launcher that weighs but a fraction of a howitzer. American planes may carry three-tube clusters of 4.5-inch launchers under each wing. Ground launchers, of which there are many types, may have many tubes or launching slides.

The only ground launcher which the Army has so far made public is the M12 artillery rocket launcher, consisting of a single plastic tube which serves both as a carrying case for its rocket and as a launcher.

The tube has three legs attached to it, and may be set up for firing from a foxhole, from against a tree, or in the open. The launchers may be wired into batteries to hurl salvos of 4.5-inch projectiles into enemy positions. The M12 is easily carried by one man. Several may be loaded into a jeep and rushed into action.

Launchers may be made of plastic or light metal, without any of the complicated recoil devices and breech mechanisms of standard artillery. They may consist of nothing but a rail or slide fitted with an electrical ignition attachment.

How Good Is Our Equipment?

This article was written exclusively for the MILITARY REVIEW *under the direction of the Director, Maintenance Division, Army Service Forces.—THE EDITOR.*

IT may shock you to learn that all of our fighting equipment is not necessarily as good as it is reputed to be. This is something every staff officer should know. For in modern warfare a unit is seldom better than the equipment with which it fights.

The weakness in our equipment is not due to any imperfection in design or manufacture. Too many experts are deeply concerned with design and construction for any serious deficiencies to creep in or exist very long. The weakness is due to lack of preventive maintenance—lack, principally, of 1st echelon maintenance by the enlisted man who operates the equipment. The enlisted operator is so far down the organizational tree, and the maintenance with which he is concerned consists of so many "trifles," that he hardly gets a passing thought in many cases. Yet in his hands rests the ultimate battle efficiency of our military machine.

That this battle efficiency is not always maintained at a high level is indicated in numerous articles and reports. To quote an isolated and admittedly unusual instance, the following full-page announcement appeared in the October 1944 edition of *Army Motors* magazine, an Ordnance Department publication:

> It burns me up to see the damage done to high-priced equipment through lack of 1st and 2d echelon maintenance. I can swear that 1st and 2d echelon work is being neglected on *75% or more* of the jobs we receive in our shops for major repairs.
>
> M/Sgt. D. S. W., Texas.

At first glance, it would appear that the entire blame for slipshod preventive maintenance rests on the shoulders of the enlisted man. But such is not the case. The problem runs far deeper than that.

There are a number of important factors outside the control of the enlisted man that can make or break a preventive maintenance program. Some of these are the state of training of the men, their mechanical aptitude and interest in maintenance, the time and facilities provided for performing preventive maintenance, the supervision they receive, the administration of the maintenance program, and the maintenance morale or incentive, or whatever you want to call it, of the men themselves.

When all of these factors are right, maintenance is right. When one or more of them is missing, the maintenance program itself is missing the boat. Here's a good example from the May 1944 issue of the *Infantry Journal:*

> An infantry division was having trouble with its motor transport. Too many vehicles were deadlined. Motor morale was low. Then two things were initiated —(1) A two-week refresher course aimed at making every staff officer in the division "Maintenance Minded." (2) The assignment of a different staff officer each day as "Motor Officer of the Day." Result: The division's motor morale is high. Vehicles are seldom in the deadline (reduced from 3.0% disabled to 0.1% in eight months). Drivers and mechanics are on their toes.

When staff officers take a personal, on-the-spot interest in preventive maintenance, the story is always the same. Maintenance takes a decided turn for the better. And in nearly all instances where maintenance is below par, it is found that the staff officers are not taking a serious interest in the situation.

One reason why many staff officers do not take a direct interest in preventive maintenance, particularly in making spot inspections of equipment, is that they do not feel qualified if they do not happen to be technicians or engineers. For those who feel that way, here is a piece of welcome news:

A division staff colonel recently called on an automotive specialist who had had a lot of experience inspecting army vehicles and asked how long it would take to learn in-

spection technique. The colonel said he was certain he could do a lot to improve maintenance of the division's vehicles if he had training that would enable him to spot check vehicles personally. The specialist's reply was that it would take about twenty minutes to get such training. And he proceeded to train the colonel.

Here is a brief course of instruction: Select eight or ten critical, though easy-to-inspect, items on a vehicle. Learn how they should be inspected. Then spot check a unit's vehicles on a basis of these few items.

If only a negligible number of minor deficiencies are found, then you can feel assured that the entire vehicle or fleet is well cared for, although you haven't investigated each and every part and probably don't know what most of them are or where they are located. If a lot of deficiencies are located among the eight or ten items inspected, then you can feel assured that the entire vehicle or fleet is being neglected.

The next step is to compliment the unit if it is doing a good job. Your inspection and compliment will make everybody feel that preventive maintenance is mighty important in the eyes of higher headquarters, and this will help stimulate the men to better efforts. If maintenance is being neglected, the next step naturally is to "raise particular L." To make this a profitable activity, however, the reasons for the deficiencies should be located first. Find out if it is due to lack of training, time and facilities, supervision, administration, morale, laxity on the part of the men, or what not. Then take vigorous corrective action.

For the benefit of staff officers who face the problem of vehicular inspection, here is a list of easy-to-inspect items suggested by the automotive specialist:

1. FORMS.—The following should be available on each vehicle: (a) Driver's Report—Accident, Standard Form No. 26; (b) Technical Manual for the vehicle; (c) Driver's Trip Ticket and PM Service Record, WD, AGO Form No. 48 (the reverse side of this important form lists the items on a vehicle on which the driver must perform daily PM or preventive maintenance services); and (d) War Department Lubrication Order. In some instances additional forms will be carried, but every vehicle should have those listed above.

2. HORNS, SIRENS, LIGHTS, MIRRORS, WINDSHIELD WIPERS.—Merely see that they are present, clean, and in proper working order.

3. TIRES.—Check one or more or all of the following: Front tires for irregular wear, all tires for excessive wear or cuts, tire pressures (don't forget the spare), and see that all tires have valve caps. By spending even a few minutes with TM 31-200, you can become pretty thoroughly informed about this highly critical item.

4. COOLANT.—See if the radiator is filled within a few inches of the top. In the winter, you might even check the specific gravity of the coolant to see if the proper amount of anti-freeze is present.

5. FAN BELT.—See if the fan belt *feels* too tight or too loose. See if it is oil-soaked, frayed, or badly worn.

6. OIL.—Check the oil level in the engine with the dip stick. Don't complain if the oil is black or looks dirty. Modern oil is designed to clean an engine internally as well as lubricate it, so it turns black quickly.

7. BATTERY.—The battery should have water covering the plates in each cell. The battery carrier should be clean and free from rust. Terminals should be clean and tight. The battery hold-down clamps should also be tightly in place.

8. STEERING WHEEL AND CLUTCH.—The steering wheel should have a small amount of free play, and the clutch a small amount of free travel. If they don't have any, or if they have an excessive amount, a deficiency exists.

9. OPERATION.—Have the operator start the vehicle, and you might even have him drive it a short distance. It should start easily and run quietly. And if it is driven, there should not be any excessive or unusual noises. Watch to see if any wheels wobble, indicating bent wheels or axles.

10. GENERAL APPEARANCE.—In general, vehicles should be kept neat and clean, but time for preventive maintenance should never be sacrificed for the sake of "spit and polish."

You may ask at this point how you are going to tell if a fan belt is too tight or too loose, whether the steering wheel has too much play, whether a vehicle has unusual noises, etc. You can prepare yourself by spending a few minutes with any motor officer or the TM for the vehicle, and by the time you have inspected only a few vehicles, these things will become obvious to you. And you will soon find it possible to add other essential items to your inspection list. These things will come to you naturally, and far faster than you imagine.

The above list of items is unofficial, though practical. Official lists of items to be inspected on vehicles appear on WD, AGO Form No. 6-68, "Spot Check Inspection Report for Wheeled and Half-Track Vehicles," and WD, AGO Form No. 6-69, "Spot Check Inspection Report for Full-Track and Tank-Like Wheeled Vehicles." These forms, plus a copy of TM 37-2810, "Motor Vehicle Inspections and Preventive Maintenance Services," will enable you to become an expert inspector in short order.

As was pointed out early in this article, when staff officers ignore preventive maintenance it is apt to be bad. When they take an interest in it, it is good almost without exception. There is only one right way to show an interest in preventive maintenance and that is through personal spot inspections. They will pay big dividends by keeping our military machine the finest in the world.

Armored Artillery

From comments of various commanders of an armored division in Italy on lessons learned during the period May—10 June 1944.

Air Liaison.—There is definite need for front-line liaison between the Air Corps and supported troops in much the same manner as artillery. The liaison group should accompany regiments with direct communications from liaison officers to air operations.

Air OP's.—Battalion air sections serve their purpose more effectively when under direct control of the battalion and situated close to the battalion. When operating as a division group, communications are usually more difficult to maintain and time required to get a plane into the air is considerably increased. Properly used, the air section is reserve observation and supplements when ground observation fails. Therefore it is necessary that the planes be in such position as to be available on very short notice.

Radio communication.—It has been found that a two-channel radio system for all observers will relieve the battalion fire direction channel of considerable traffic not pertinent to fire missions, the alternate channel being used to carry such transmissions as position reports, reports of forward elements, information of S-2, and other transmissions not essential to the conduct of fire.

Close-support liaison.—It has been found in recent operations that where the field artillery battery is detached from division artillery control and assigned or attached to control of the combat command with which it is operating, a closer relationship can exist between the supporting and supported troops. Information as to supported troops can be obtained more quickly and the field artillery can position itself so as to make adequate support available at all times.

Coordination.—There is definite need for adequate information as to the progress of adjacent combat teams when operating abreast. In recent operations a number of profitable hostile targets were allowed to get away due to the fact that adequate information was not available to forward elements of adjacent combat teams.

The Battle of the Aleutians

From an account produced by the Intelligence Section,
Field Force Headquarters, Adak, Alaska.

Enemy Attack—Dutch Harbor Bombed

WHEN, on 7 December 1941, the Japanese first attacked the United States at Pearl Harbor we had, on all our Alaskan islands, only two small army posts and naval bases. One was on Kodiak Island [about 350 miles northeast of Cold Bay]. The other was at Dutch Harbor on Unalaska [Figure 1]. In all wide-spread Alaska we had but six small army posts.

In June 1942, the Japanese struck at Dutch Harbor. But this time they did not catch us napping. Two secret airfields had been hastily installed just east and west of Dutch Harbor. One was at Cold Bay, near the tip of the Alaska Peninsula. The other was on Umnak Island. The Blair Packing Company and Saxton & Company, supposed to be canners of fish, were the disguises these secret airfields wore. On 2 June 1942, two Japanese aircraft carriers were reported less than 400 miles south of Kiska. They were moving eastward. Bad weather fought against us there. Air reconnaissance was almost impossible. Patrol planes would find the Japanese, only to lose them again in fog and storm before bombers could be brought to the spot. Bad weather always played a part in Aleutian warfare. On 3 June, and again on 4 June, bombers and fighters based on these carriers attacked Dutch Harbor. Bad weather fought against American and Japanese alike. All available planes of the Eleventh Air Force had been rushed to our two secret airfields. They went up to meet the Japs, who had thought our nearest airfield was on distant Kodiak. Many of the Japanese planes failed to return to their carriers. Bad weather had a lot to do with that. But that same bad weather made it impossible for our planes to destroy the Japanese carriers or their convoying warships. The enemy task force withdrew from Dutch Harbor and occupied Kiska, some 700 miles to the west.

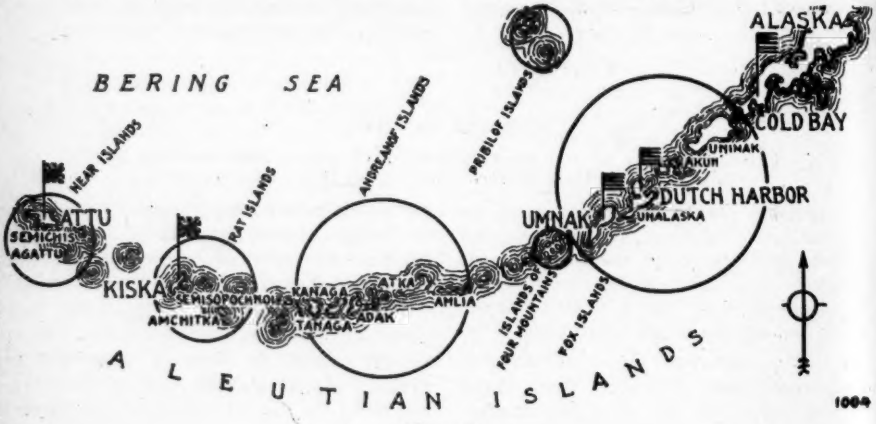


Figure 1.

War had come to the Aleutians—to a chain of islands where modern armies had never fought before. Modern armies had never fought before on *any* field that was like the Aleutians. We could borrow no knowledge from the past. We would have to learn, as we went along, how to live and fight and win in this new land, the least known part of our America.

Counterattack—The Occupation of Adak

The Navy had a weather station on Kiska. When this station failed to send its usual reports after 7 June, enemy interference was suspected. But not until 11 June did the weather permit air reconnaissance. Then Japanese were seen on Kiska and Attu. The next day Eleventh Air Force bombers made runs over Kiska, hitting and setting fire to two cruisers and one destroyer. Two days later the Japanese bombed a seaplane tender at Atka Island and, a week after that, began to reconnoiter Adak [Figure 2]. The battle of the Aleutians was becoming a race for the possession of those islands in the chain which were suitable for landbased aviation.

Meanwhile, we bombed and strafed Kiska and Attu whenever the weather permitted, and our surface ships and submarines attacked Japanese shipping in Aleutian waters. On 18 June a transport was sunk in Kiska Harbor. On 4 July two of our submarines sank three, and possibly four, enemy destroyers. On 7 August U. S. warships shelled Kiska Harbor. On 31 August we took our first Japanese prisoners in this theater—five survivors of a destroyed Japanese submarine. And on 30 August U. S. forces landed on Adak. The first landing boat hit the beach at daylight, seven o'clock in the morning. It was quiet. The men had embarked prepared for almost any kind of trouble, but, twelve hours before they landed, news had come that there were no Japanese on the island. They had won their race. They had gotten there first.

And then trouble came, a willawaw, the sudden wild wind of the Aleutians. Nobody knows how hard the wind can blow along these islands where the Bering meets the Pacific. Later there was a gauge to measure the wind on Adak, but it only measured up to 110 miles an hour, and that was not always enough. The wind sometimes blew it over the top. That first morning the wind stopped landing operations with only a portion of our force ashore and, by noon, had piled many of the landing boats on the beach. The men ashore had no tents, no shelters of any kind. They dug holes in the ground and crawled into them for protection against wind and rain and cold. When the wind had quieted enough to let the others come ashore, they too dug holes and lived like that while the cold, wet, and backbreaking work of unloading ships by means of small boats went on. And they did what they had come to do. They built an airfield. They built an airfield in twelve days. Engineers, infantrymen, artillerymen alike, they drained and leveled a tide-water flat and a creek bed, and by 12 September planes were taking off.

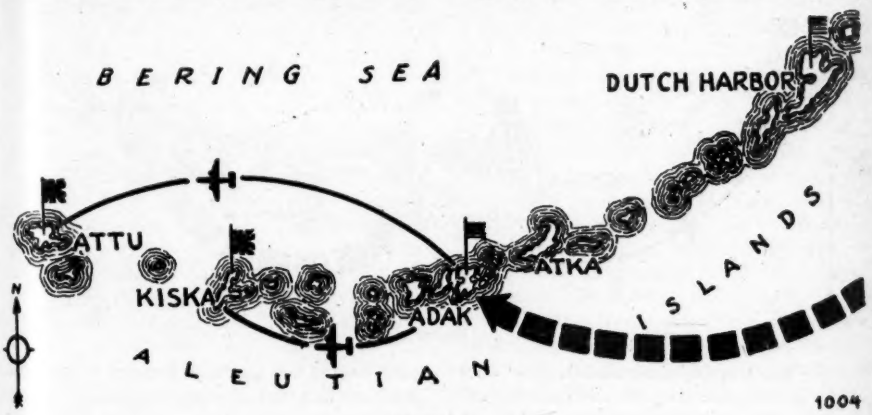


Figure 2.

On 20 September an army task force occupied the island of Atka, sixty miles east of Adak. There, too, airfields, docks, and military facilities were constructed. Atka became another link in our chain of Aleutian bases.

On 14 September Adak bombers scored hits on three large cargo vessels at Kiska, sank two mine-sweepers, and strafed three midget submarines and a four-motored flying boat. Hundreds of miles had been lopped off our roundtrip distance to Kiska and Attu and back—and to Paramushiru [Figure 6], the northern Japanese stronghold.

The Japanese retaliated with token bombing of Adak on 2 and 3 October. The men on the island called the enemy flier "Good Time Charlie" because he came over around three o'clock in the morning. Good Time Charlie did not worry them very much. They had built their airfield. Their job was now to maintain and protect it. They built docks and roads, and they moved from their holes to tents, and then into quonsets and Pacific huts. They had more fuel now—and could cook food instead of living on "C" rations. We had run our race for an island and won.

COUNTERATTACK—THE MOVE ON AMCHITKA

Our airfield on Adak was a little more than 200 miles from the Japanese on Kiska, and nearly twice that distance from Attu. Planes left Adak to strike at the Japanese every day that the weather let them. But there was another island on which planes could be based only seventy miles from Kiska. This was Amchitka, one of the flattest of the Aleutians [Figure 3]. Scouting parties on Amchitka hid while Japanese reconnaissance planes circled overhead. In December our scouts reported that Japanese patrols had dug test holes on Amchitka, hunting for suitable airfield sites. Another race for an Aleutian island was on.

On 12 January 1943, U. S. forces landed on Amchitka. They came ashore as they had come ashore at Adak—wading through icy surf. They came ashore from jam-packed freighters and transports and barges that had sailed and been towed through long days

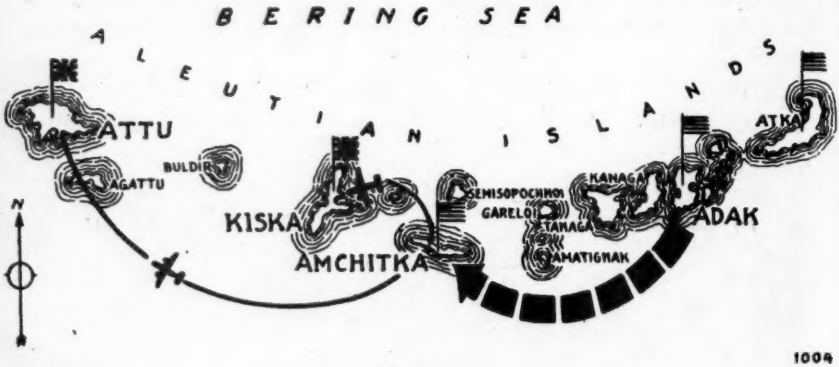


FIGURE 3.

and nights of fog and storm. Again bad weather had no favorites. It kept the Japanese planes home at their bases, and played havoc with our shipping. Not until twelve days later were our Amchitka forces attacked from the air. And they made good use of those twelve days. It was the story of Adak over again. Men toiling without rest in winter rain and wind, in the bitter cold surf of Constantine Harbor, through black Aleutian mud, over hard rock and heavy tundra. Unloading, carrying ashore, storing, protecting arms, ammunition, food, equipment, fuel even to the smallest kindling. For here in the Aleutians the soldier's needs are many and the country can supply him with literally nothing. No one

who has not seen it can have any conception of the tremendous quantity of supplies and equipment that must be moved from ship to shore. And, once ashore, all this vast mountain of material had to be transported by hand. Vehicles were of little use in those all-important early days of the occupation. And these men did what they had come to do. They built their airfield. From 24 January on, Japanese planes scouted and bombed Amchitka whenever weather permitted. But by 18 February a new fighter strip was ready for Warhawks and Lightnings. The Japanese bombers came over no more.

The occupation of Amchitka, like the occupation of Adak five months before, let us still further increase the pressure on the Japanese at Attu and Kiska. Within two months our reconnaissance and bombing missions had forced the enemy to give up attempts to bring reinforcements and supplies to Attu and Kiska by surface vessels.

Aerial photographs taken on 19 January had revealed the beginnings of an enemy fighter strip south of Salmon Lagoon, on Kiska. This strip—and another strip begun about the same time on Attu—were the targets for constant attacks throughout the spring. As a result of these constant attacks, and of our success in keeping supply ships from bringing adequate machinery to the islands, the Japanese failed to finish either airfield.

With the occupation of Amchitka, the stage was set for a new phase in the Aleutian campaign. We had been racing the Japanese for island bases. Now we were next door to the Japanese-held base of Kiska. Attu, the only other base the Japanese held in the Aleutians, was nearly two hundred miles farther away. Either island would have to be taken by force. And Kiska was the more important of the two, as well as the more accessible.

It was decided to by-pass Kiska and take Attu first. For this there were two reasons: (1) The Japanese were expecting us to attack Kiska, and (2) with Attu on our hands we would have the Japs on Kiska—not surrounded, for with the weather as violent as it is in the Aleutians no island can ever be kept surrounded—put pinched between our bases.

Attack—The Battle of Attu

The Japanese had occupied Attu in June 1942. In mid-September a Jap infantry battalion moved from Attu to Kiska. Our air reconnaissance first reported this movement on 22 September. It is probable that the Japanese either evacuated Attu completely or withdrew most of their forces at that time. In late October a reoccupation force from Japan reached Attu. Beach defenses were immediately constructed in both arms of Holtz Bay and the Japanese garrison was reinforced from time to time until March 1943. By then there were about 2,200 men in the garrison.

The most important mission of the Japanese garrison on Attu—aside from defense of the island—was the construction of an airfield at the East Arm of Holtz Bay [Figure 4]. Thanks to Adak and Amchitka, our mastery of the air kept them from accomplishing that mission.

Attu is about forty miles long, twenty wide, and its highest peak rises more than 3,000 feet above the sea. On 11 May 1943, after being delayed four days by bad weather, U. S. forces landed on the island. From the very beginning the Japanese were on the defensive, and made the most of the terrain for that purpose. The occupied portion of Attu was divided by the Japanese into two main defense sectors, (1) the Holtz Bay sector, and (2) the Chichagof sector, which included Massacre Bay and Sarana Bay. Although they must have expected a landing at Massacre Bay, the Japanese had not organized beach defenses in that area. Instead they chose to defend the high ground at the northern end of Massacre Bay, 3,000 or 4,000 yards inland, and the valleys leading to Chichagof Harbor. The beaches of Chichagof Harbor and Holtz Bay were strongly defended against frontal attacks, but no protection was given to the area immediately north of Holtz Bay, and some of our forces landed there unopposed.

In general, the enemy used the same tactics he had used—and is still using—in the

Southwest Pacific. Though he lacked foliage and tropical growth, he prepared excellent camouflaged positions, and dotted the terrain with foxholes, two-man caves, and light machine-gun and mortar positions. Enemy rifle fire was generally inaccurate, and the sniping, though annoying, was never a serious hindrance to our progress. But, in the early stages of the fight, small groups of Japanese with light machine guns and the so-called "knee mortar" often had our troops hugging the ground, unable to advance. The constant use of "small group" tactics forced us to search thoroughly every square foot of area to our rear as well as on our flanks. Japanese would lie motionless for hours at a time. Their rifles and machine guns gave out no flash, no smoke, to betray their positions. The enemy on repeated occasions counterattacked against superior numbers in daylight, though it has been said that the Japanese attack only at night. The much-discussed fanatically reckless fighting spirit was shown by the small number of prisoners we took, by their killing their wounded rather than letting them fall into our hands, and by such desperate kill-or-be-killed assaults as that of 29 May in which every Japanese who could walk took part, some armed only with bayonets tied on the end of sticks.

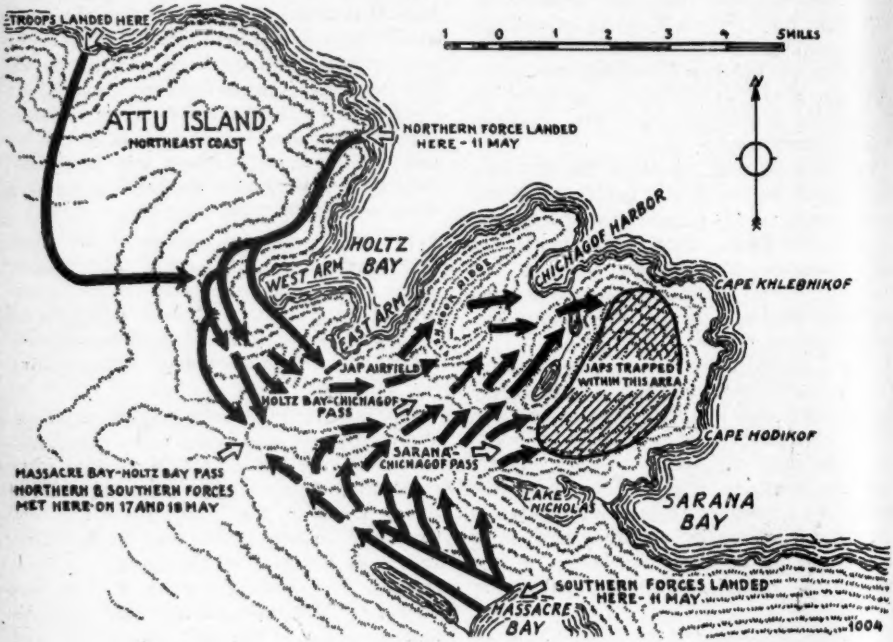


FIGURE 4.

A last attempt to aid the Attu garrison by a formation of sixteen Japanese bombers was blocked by Eleventh Air Force fighters. Only four of the enemy planes escaped destruction. They fled in the fog. The annihilation of the Japanese at Chichagof Harbor was completed on Memorial Day, 30 May 1943. An observer at Attu said, "American troops do their best fighting when they can close with the enemy and see what they are shooting at." On 10 July U. S. planes took off from Attu—to bomb Paramushiru.

Retreat—Flight from Kiska

With Attu in our hands the Japanese occupation of Kiska was doomed [Figure 5]. And the Japanese knew it as well as we did. Kiska was first occupied on 5 June 1942, by a special landing party of 500 Japanese marines. At the same time some twenty Japanese ships, including four transports, moved into Kiska Harbor. In September the Kiska garrison was reinforced by about 2,000 additional personnel, and, at about this time, was placed under the command of Rear Admiral Akiyama. Shortly afterwards an infantry battalion was moved to Kiska from Attu. In December 1942 and January 1943 additional antiaircraft units, engineers, and infantry arrived at Kiska, and in the spring of 1943 the tactical command was transferred from the Imperial Navy to Lieutenant General Higuchi, Commanding General of the Northern Army.

Japanese fighter and reconnaissance plane replenishments, boxed and crated, came to the island on the decks of small plane transports carrying seven to nine planes each trip. By air combat and by strafing planes on the ground, the Eleventh Air Force whittled the Japanese air strength down as fast as new planes could be brought in. At no time during the enemy occupation of Kiska did he have more than fourteen effective planes on hand.

March and April 1943 saw increasingly severe bombing attacks on Kiska. On 26 March, a light U. S. naval force engaged a heavier enemy fleet and foiled an effort to run supply ships into Attu or Kiska. This was probably the last known Japanese attempt to supply either island by large surface vessels. Enemy submarine activity in the waters around Kiska increased in late spring and early summer but was unsuccessful. A number of them were sunk by our naval forces.

Bad weather and our concentration on Attu gave Kiska some rest in May. But after Attu fell we went to work on Kiska in earnest. Throughout June and July the intensity of our attack increased almost daily. During the first six months of 1943 the Eleventh Air Force dropped more than 3,000,000 pounds of bombs on the enemy installations. After the fall of Attu this deadly power was concentrated on Kiska. Nearly 900,000 pounds of bombs were dropped on that island in July. Demolition, general-purpose, incendiary, and parachute fragmentation bombs were released from high level, medium level, deck level, and dive approaches. Fuzes ranged from instantaneous to long delay. Liberators, Mitchells, Dauntless dive

Figure 5.

bombers, Lightnings, and Warhawks swooped over Kiska in coordinated and determined attacks. Kiska Island was to be made untenable.

The first indication of a possible Japanese attempt at evacuation came on 10 July, when a Navy PBY spotted four small cargo vessels between Kiska and Japan. Mitchells and Liberators sank one, left one sinking, and damaged the other two. In aerial photographs taken over Kiska from 22 June on, other evidence of what might be preparations for evacuation was seen. This evidence included the destruction of some barracks, the removal of some guns, and unusual activity among barges in Kiska Harbor. On 28 July the Kiska radio went off the air. Later aerial photos showed trucks parked in the same position day after day. Naval shelling of Japanese installations drew no answering fire, and Eleventh Air Force units had only small-arms fire to contend with. Presumably the main body of Japanese troops had finished its evacuation of Kiska during the night of 28 July, going by barge to waiting surface ships or submarines. At daylight of 15 August 1943, U. S. and Canadian troops occupied Kiska. Even those enemy detachments responsible for the small-arms fire reported by planes over the island after 28 July had cleared out.

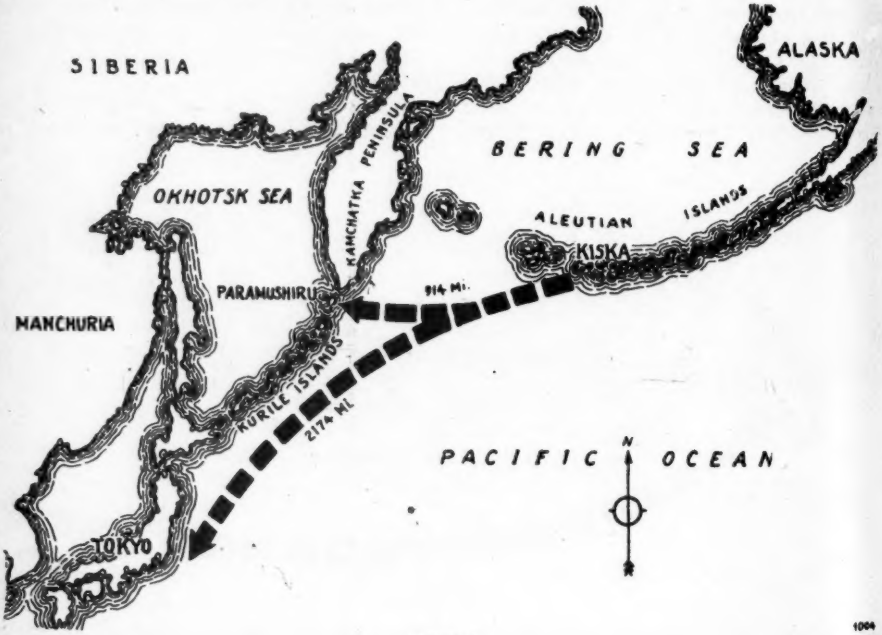


FIGURE 6.

THE NORTHERN HIGHWAY TO VICTORY

The Aleutian Islands are the tops of submerged mountain peaks—a 1,000-mile westward extension of the high volcanic ranges of the Alaska Peninsula. Some of these submerged peaks rise more than four miles from the ocean bed; there are few places where the ocean is deeper than here. Once upon a time, long ago, this now-sunken range may have been a land-bridge from Asia to America over which America's prehistoric inhabitants slowly made their way east to this new land. Now we have made of these islands

a road over which we may swiftly make our way to Asia [Figure 6]. The Eleventh Air Force—with many strong bases on the Aleutians—is now the northern arm of a gigantic many-armed air force pincer closing on the Japanese Empire. Elements of the Eleventh Air Force have already struck at the strong Japanese military and naval installations on Paramushiru. The story of the Aleutians in this war is not yet finished.

Small-Arms Care

FEW American boys grow up without learning to "tinker," whether it be with radios, automobiles or some other type of mechanical equipment. In normal life this is a habit to be admired and encouraged, and it has been a big help to the Army in finding men with mechanical abilities. But there are also occasions in the Army where tinkering is the cause of needless and costly damage to equipment.

This has proven to be the case in the instance of small arms, for many soldiers are attempting unauthorized disassembly and repair of their weapons. The result is that too many weapons must be sent in to higher echelon maintenance units for repair.

The damage that is done by the inexperienced soldier is almost unbelievable. For example, screw heads are ruined by the use of wrong-sized screw drivers or instruments never intended to be used as screw drivers. Set-screws, machine-screws and the like are changed without regard for interchangeability with the result that stripped threads render them useless. Parts of weapons are disassembled or assembled with force, which results in burring and damaging the parts. Care is not taken to protect disassembled parts, so loss or damage to the parts occurs. Tension or compression of springs is changed, trigger pull action is modified and damage usually results.

Modern weapons are manufactured by skilled technicians. Repairing them requires specific tools, the right amount of time and practiced hands—and these essentials are seldom, if ever, available to the soldier in the field. There are only two services the soldier is authorized to perform on his small arms—*clean* and *lubricate*. This includes, of course, field stripping, in which no tools are required. The Field Manual for the individual weapon specifies just what may and what may not be done in performing these services. Therefore, it is the unit commander's responsibility to see that the instructions in these manuals are made available to and learned by the soldier. The manuals, all in the 23 series, are listed in FM 21-6, and copies may be obtained from The Adjutant General's Office by presenting evidence that they are needed.

Cleaning and lubricating have been made as easy for the individual soldier as possible, so there is no valid excuse for failing to perform these services. The new rifle bore cleaner and preservative lubricating oil are both issued in handy, cigarette-pack size containers which can be carried in a cartridge belt and thus be readily available for use at all times. And cleaning patches now come in small packs of 25, wrapped in water-and-dirt-proof paper envelopes.

A rifle, carbine or pistol that is always cleaned soon after firing and for three successive days afterwards will keep its accuracy and dependability indefinitely. So far as the soldier is concerned, proper care, use and handling are the only other requisites for effective maintenance. But personnel responsible for storing and shipping small arms have the added responsibility of protecting them against corrosion and rust, packing them properly in *standard field containers* and storing them in dry places.

These few simple practices, if faithfully and carefully followed, can do much to keep high echelon maintenance of small arms—costly in terms of both time and money—at a minimum. (Released by Maintenance Division, Army Service Forces.)

Galloping Juggernaut

MAJOR ALBIN F. IRZYK
Headquarters, —Tank Battalion

ON 25 July 1944, prefaced by a huge, stunning air bombardment, an offensive was launched in Normandy. A waiting world which had been hearing of no progress on the stalemated French front and which had been taking solace in crushing Russian victories, was stirred with excitement at the initial success of the Cotentin drive. As each succeeding day brought news of more and more progress, excitement mounted and estimates on the possibilities resulting from the breakthrough knew no bounds.

People everywhere began to read of the work of armored columns which were starting a headlong drive across France, and which were to write new pages in the history of the war. Tanks and tank commanders suddenly gained for themselves new and greater eminence. For many days, papers wrote of little else. The world had become armor conscious, and the work of armored columns was on everyone's lips. The speed and accomplishments of American armor were compared most favorably with what the Germans and Russians had done during their most triumphant days.

This article will describe in some detail the operations of tanks, a tank battalion, and an armored column. The operations recorded may or may not have been typical of other and similar units, and the methods and tactics employed can, no doubt, be improved upon. At any rate, the units whose actions I shall describe met with much success, so the basis upon which they worked must have been sound.

In my opinion, tank and therefore armored warfare in France to date can be divided generally into three phases: (1) "Hedgerow Phase," (2) "Road-March Phase," and (3) "River-Crossing Phase." The fourth phase and perhaps subsequent phases are looming before us. Each of the three phases now behind us will be discussed separately. [The "Hedgerow Phase" has been discussed in other articles in the MILITARY REVIEW and in order to conserve space it will be omitted here.—The Editor.]

ROAD-MARCH PHASE

Dawn, after a long, dark, troublesome night, came to hedgerow fighting on 25 July. Tanks, supported by infantry who rode the tanks, were massed, and with a violent, thunderous, and desperate effort achieved the breakthrough which proved to be the turning point of the war. Tanks and armored units jumped into the foreground and gained an enviable position which to date they have not had to relinquish. From that day to this they have spearheaded the effort in France, and their accomplishments and achievements are many. By breaking out of the hedges during the latter part of July, the "Hedgerow Phase" was left behind and the second phase, a much more colorful one, began.

With the crust broken, armored units now formed up into armored columns to begin the push which was rapidly to become a headlong race. Each column with its cavalry troop [mechanized], armored infantry battalion, armored artillery battalions, tank battalion, tank destroyer company, antiaircraft platoon, engineer company, maintenance company, and medical company now began to move on the road. In single column, vehicle behind vehicle, with at least seventy yards' distance between vehicles and often much more, the column stretched for many miles. Led by an advance guard at first consisting of the cavalry troop in front, followed by an armored infantry company, a platoon of tank destroyers, an armored field artillery battery, and finally by an engineer platoon, the column moved out slowly, and was jerky. Like a young child taking its first, few, unsteady steps, the column was finding its feet. Short, slow moves followed by long, monotonous halts typified the progress of the column during the first two or three days. Although the enemy had been broken, disorganized, and

put to flight, he was still close enough in front to fight, harass, and thus delay.

Initially, the advance guard was under the command of the infantry battalion commander. His unit, less the advance guard company, led the main body. Close behind were the balance of the tank destroyers followed by all the artillery. Interspersed in the column were vehicles of the antiaircraft platoon, combat command headquarters, and artillery group headquarters. Near the end of the column was the tank battalion followed by the miscellaneous service elements.

During the days ahead, the make-up of the advance guard and the main body was to be modified often. As just described, it proved to be highly effective and successful during the first days.

After he was routed, the enemy, with fight still left in him, gathered on the main roads and in villages and towns along the roads. It was the early resistance that the retreating Boche provided that delayed the column and caused the short moves and the long halts. Jerry placed occasional hasty mines and road blocks, and blew small bridges over creeks. He defended his road blocks lightly, but he sniped treacherously and tenaciously in the villages.

As a result, the cavalry proceeded slowly and, with the help of the infantry and engineers behind them, cleared the mines and the road blocks with their handfuls of defenders and cleared the snipers and riflemen out of the villages. The latter often had to be cleared house by house. Resistance as a whole, however, was not heavy, and therefore artillery, tanks, and more infantry were not needed. Rather, it was merely annoying and time-consuming. Meanwhile, power and strength and mobility were halted back along the column.

Despite the disturbances and annoyances, the column moved and miles were consumed. Upon reaching the large cities standing squarely in the path of the column and which were key objectives, resistance was much stronger and better organized. Here the column had to halt, deploy, and do battle. The enemy in such a spot could not be thrust aside merely with the pass of a hand.

Conquest of such cities took time, planning, and coordination as well as hard, bitter, savage, bloody fighting and losses. Artillery had to go into position and blast the town. All available infantry left their half-tracks and advanced on foot. Cavalry and even engineers assisted the doughboys. Tanks deployed and outflanked; and they guarded and defended key places, approaches and exits as well. Resistance consisted again of mines, and of snipers and riflemen in nearly every building. Their resistance was strengthened by heavy and troublesome mortar fire and by antitank guns cleverly placed. The process of cleaning these spots was slow and painstaking. Streets had to be swept for mines. Building after building had to be cleared. Snipers, machine gunners, and mortar crews had to be captured or destroyed. Only then could the column form up and move again.

Movement was once more steady, but only until the next city was reached. The deployment, attack, and conquest had to be repeated. Enemy tanks now were met at road intersections in towns. Defending forces often greatly outnumbered the attackers, and only because the worried Germans were on the run, had inferior organization, and were oppressed by a spirit and morale that had been seriously and severely cracked were the advancing elements able to dislodge them rapidly and capture them by the thousands.

It was at about this time that the tactical air force, of which so many had read so much, really showed its wares. The airmen proved on more than one occasion to be the balance of power, the force which rapidly changed a ding-dong, give-and-take struggle into a glowing victory. From that day on they ranged far above the column in all its movements and are at this very moment giving the units close, prompt support. The P-47's especially, which are so familiar to members of the column, and the P-51's as well, won an increasing amount of admiration from day to day, until today they are most deeply respected. Very, very often they bring sunshine to an otherwise gloomy situation, and their presence perceptibly raises morale and often

virtually physically raises men from their foxholes.

At about this time, too, tanks were brought up to the advance guard. First it was a platoon and later a company. It was found that the presence of tanks in front speeded progress considerably. Often, enemy who defended hotly and fought tooth and nail against cavalry and infantry changed their minds quickly when tanks put in an appearance. They either ran away or came in with hands on their heads.

With resistance fairly stiff and with the presence of enemy tanks and antitank guns imminent, a platoon of tanks in front with the cavalry worked well. Two ¼-ton C & R's and an M-8 reconnaissance vehicle working with and immediately in front of the tanks proved highly satisfactory. The peeps and reconnaissance car picked the route, and poked around corners and around bends in the roads. If all was clear, they kept moving. If something other than tanks or antitank guns lurked ahead, they pulled back beside or behind the tanks until the enemy was blasted by the tanks. If an enemy tank or an antitank gun was ahead, the tanks were sufficiently warned. Without exposing themselves beforehand, they were able to maneuver around the tank or antitank gun lying in ambush and destroy it. A company of tanks directly behind a troop of cavalry, too, was found to be most effective.

Upon reaching Brittany, with key cities in Normandy already entered on the victory ledger, the armored columns picked up speed rapidly and began a trek that gained for itself portentous results. The column rolled unceasingly and then rolled some more.

Opposition now became scattered. The column often caught the enemy in vehicles, in carts, and on bicycles fleeing just in front of it. Capture of these was easy and even fun. Occasionally, towns and villages were briefly and hotly defended by dismounted men.

Bridges were still found blown, but were rarely defended. Each of these necessitated a short delay. They were hardly perceptible, however, when compared to the ground covered.

Delays and resistance notwithstanding, the column now made progress and attained speeds and gained results seldom approached, much less equalled, by similar units on maneuvers. The column reached its peak and reached a state of near-perfection in road marching by accomplishing a feat which, in my mind, has not been equalled in combat or on maneuvers. Facing no resistance whatsoever, the column marched continuously for thirty-six hours and covered a total distance of 258 miles.

Back in hedgerow fighting, when enemy ack-ack was heavy, when Me 109's were apt to appear at any moment, a new star, a new hero was born. The liaison pilots in their grasshopper cubs endeared themselves to everyone. Now they became the darlings of the armored column. Affectionately labeled the "Maytag Messerschmitts," they hovered always over the column like a mother hen caring for her brood. It was a cheering sight to see the planes at the first crack of dawn and to see them continuously until night had completely fallen. Often they were in the air on days with such a low ceiling that it seemed foolhardy, indeed, to fly. In addition to being a strong morale factor, the planes served in a far more important and in an intensely practical manner. They flew ahead of the column and reported back on condition of bridges, on clearness of the route, and on the presence of enemy. Often miles before the column hit opposition, the units had been warned by the grasshoppers of what to expect. Above all, the liaison pilots were ready to adjust artillery fire just as soon as the first battery could leave the roads and "toss" out its first round.

Soon Brittany was cut and portions of France farther and farther east were penetrated. To move faster and to accomplish twice as much, the column was now divided into two columns. Both columns were potent forces all their own. Each had its own objectives, and although both were controlled by the same headquarters, one worked separately from the other.

In one column was a portion of a cavalry troop, the tank battalion with a company of

armored infantry attached, one field artillery battalion and often more, a platoon of engineers, a platoon of tank destroyers, and units from the service elements, all under the command of the tank battalion commander. The other column, commanded by the armored infantry battalion commander, consisted of the remainder of the cavalry reconnaissance troop, the infantry battalion, at least one battalion of field artillery, a company less a platoon of tank destroyers, a company of tanks, a platoon of engineers, and service elements. Both columns were kept generally abreast, and in the course of their operations were often brought together into assembly areas for reorganization prior to embarking on new missions.

As in Brittany, much of the advance was against light, scattered, and disorganized resistance. Only in the large cities and towns was resistance stiff. Many of the cities so famous and well known to us were key places in highly important and strategic locations. Railroads and roads in many cases radiated from these cities in all directions. The desperate Huns defended these locations hotly with what they had. A different plan, a different attack, naturally, had to be followed in each case because of varied terrain, type of defense, and strength of resisting elements; but in all cases the armored column was forced to deploy and to use all its forces, which fortunately were usually enough. The capture of such a city took a day, perhaps two or three. Then the race by the buoyant, cocky, and triumphant forces continued to the next defended locality.

Throughout the second phase, progress was so rapid it was exhilarating. The column gained a maximum of results with a minimum of effort and losses. Nevertheless, lessons were learned which will prove valuable in future movements.

An advance guard must have a light force as its point, and, in my opinion, this should consist of a cavalry troop or a platoon. Such a unit carefully checks and follows the designated route and modifies it in the event the one selected proves impractical. Because of its mobility and speed, the cavalry is able to move swiftly when fired upon and at the same time report the nature, strength, and location of the opposition.

Immediately behind must be a striking force consisting of light tanks, tank destroyers, and often better yet, medium tanks; or a combination of all three. If opposition is weak, the armored vehicles can wipe it out without unduly delaying the progress of the column. If heavy, the armor is able to pin down the enemy by fire and test his strength and dispositions while other elements in the column are deploying.

In the advance guard, an infantry unit, preferably a company, is needed to follow the tanks closely on the road and especially in close action when the infantry is then dismounted. Infantry behind tanks is vitally needed to mop up and dispose of stragglers missed by the tanks, to search and clear buildings, to protect tanks from the rear, and to collect and handle prisoners.

An engineer platoon and an artillery battery must be included in the advance guard. Having the engineer platoon near the front of the column makes them available for quick mine-probing, for demolishing road blocks, and for rebuilding small bridges. The artillery is needed near the front so as to be able to go into position rapidly and to register on the enemy immediately. Thus, by the time the artillery battalion has left the road and has moved into position, the advance guard battery will be able to furnish the data necessary to fire the battalion without delay.

The order of march of the above elements is debatable. No hard and fast rule can be laid down. Rather, the order must be adjusted often to suit the terrain over which the column is to move, and the nature of obstacles and opposition anticipated.

There will be instances when the infantry will lead the main body, and occasions will arise when the tanks will go ahead. As in the case of the order of march of the advance guard, the existing situation will be the deciding factor. In all cases, however, the artillery will follow immediately behind the leading unit. When artillery is called for, it can be assumed that a grim situation lurks ahead.

It is vital that the artillery be up in front where it can do some good and in a hurry!

It goes without saying that, when called for, the artillery has road priority. Everything moving or stopped gets out of the way. The roads must be opened and cleared so that nothing will delay the passing of the artillery vehicles.

In any discussion of the make-up of a column, the rear guard must not be neglected, especially when the column has no other elements following directly behind. If vehicles packing a good wallop tail the column, it is sure to be in good hands. Small units of tanks and tank destroyers are suggested for the job.

In a marching column, whether in an approach march when contact is imminent or with contact already made, the very same principles and lessons learned in training and on maneuvers apply more strongly than ever. It might be well to discuss briefly a few of those most abused.

The prime objective of the column commander is to get a column to the designated place in sufficient strength, in good enough condition, and in proper order *to fight it immediately*. Success in this matter will be ever out of reach unless everyone in the column practices strict road discipline. Vehicles must maintain a distance of no greater than seventy yards, but to be careless in this matter is to be burdened with an endlessly long, straggling column.

Units within the column must be alerted prior to stopping and starting. The strictest of control is required. This practice is particularly applicable to organizations within units. Everything must stop and start together. To violate this procedure is to cause many vehicles in the column to speed continuously at a breakneck speed in a hopeless effort to catch the vehicle in front. When such a situation exists, it is an easy matter for a vehicle to take a wrong turn and to carry much of the column with it. A disaster of no mean proportions could easily result.

Once the column is moving, nothing except a light wheeled vehicle, or artillery vehicles as previously mentioned, may pass. Only vehicles used for column control and those needed up ahead should be permitted to double the column. Track vehicles and tanks must *never* pass a moving column. Double banking, however, is permissible when the column is halted.

On a long march, vehicles fall out frequently for maintenance, and a knotty problem is the result. As soon as repairs are completed on a vehicle, the natural tendency for the crew is to race frantically in a reckless effort to catch their organization. Such an effort endangers lives both in the vehicle and in the column, and breaks and confuses the column as well. Such a practice can be efficiently solved. It was found highly satisfactory for the unit maintenance officer to collect all repaired vehicles into a column of his own and to march them as a unit until the march was completed. It was discovered, too, that often a vehicle that had fallen out for maintenance caused an unnecessary halt all the way behind it. Two instances of carelessness were responsible. Had the vehicle immediately posted a guide to wave by all vehicles behind it, or had someone in the vehicle behind immediately gone forward to investigate the cause of the halt, no unnecessary delay would have resulted.

On long marches at a steady, rapid pace, especially on very hot days, tanks became heated, bogey wheels suffered, and rubber tracks took severe punishment. To save wear and tear on vehicles and on crews, an extended halt during the hottest part of the day was deemed most advisable.

Night marching could be very profitable, and conversely it could prove exceedingly unprofitable. If distance had to be covered rapidly at almost any cost, great gains could be made on a night that was clear and bright, and especially with a moon. Marching in the cool of the evening with the dust settled by atmospheric conditions often brought highly satisfactory results. To march on a dark night, however, was of little proportionate value, dangerous, and foolhardy. In fact, it was an invitation to disaster. Much could happen. Vehicles could become lost easily and take dozens of other vehicles with

them. Sudden stops meant numerous accidents. Above all, vehicular crews became exhausted by the time daylight came. At best, progress had to be slow. All in all, unless assured of a clear, bright night, it would definitely be most wise to go into a bivouac as night descended and to get on the road again at first light.

The pace of the column must always be set by the slowest-moving vehicle in the column. Otherwise, over an extended march many vehicles would never catch up.

A column the size of the initial one described and subjected to many of the violations just discussed has been known to stretch for the unheard-of length of seventy-six miles on a forced march. That is, indeed, something of which to beware.

The galloping juggernaut, which for many days had been rolling in nothing but high gear, suddenly came to a screeching halt. The glamor of war and unstinted success tumbled suddenly on crumbling walls and quickly gasped its last. The first of the rivers was reached, and the road-march phase faded quickly away. Progress from here on was to become costly and slow. The third phase was in the offing.

River-Crossing Phase

The third phase was tough. River after river had to be crossed. In each instance dominating ground overlooked the rivers, and every one was a definite, separate, and difficult obstacle that was a severe test to an armored unit. At any moment an attempted river crossing could easily become an invitation to disaster. The physical aspects alone were difficult factors with which to contend; but add to them a determined, troublesome enemy, and a struggle of no mean proportions was sure to ensue. To the armored column pressing ever eastward, the stretch ahead looked formidable indeed.

Virtually every river had a canal paralleling it. Most often, the canal was a much more difficult and serious impediment than the river itself. The banks of the muddy canals were vertical and twelve or more feet high. More often than not, their composition was of concrete. Although the canal locks had generally been destroyed, a foot or two of water remained, and beneath there was a deep layer of soft, sticky, treacherous mud. This was a tank obstacle indeed!

The fast-flowing rivers were deep but often fordable by tanks in limited places. Here again banks were many times steep and high. It was a sure bet that bridges across both the canals and the rivers would be blown. To make matters worse, the dominating ground seemed always to favor the enemy. From the opposite side of the river, the high hills, like a sneering giant, loomed down upon the attacking elements.

The well-defended towns, situated at the crossings, were of necessity the initial objectives. In virtually all cases the defenders were in strong positions on the opposite side, but in some instances they defended on the near side of the river as well.

Two helpful factors gave the dark task ahead a touch of a silver lining. They were: (1) favorable terrain, and (2) land between water barriers. The high ground on the near side of the river overlooked the river, the town, and the shattered bridges, and gave observation on the dominating ground on the other side. Of material assistance, too, was the strip of ground that separated the canal and the river. Sometimes this strip was very wide, sometimes narrow; but in all cases it was big enough to divide the river-crossing job into two parts: the canal crossing and the river crossing. The strip enabled units to catch their breath after breaching the first obstacle and to get their second wind for the next crossing.

Canals and rivers were obstacles difficult to surmount, especially by tanks. Everyone knows that the initial crossing of a river and a canal and the securing of a strong bridgehead is primarily an infantry mission, and until such a task is completed, engineers cannot commence putting in their bridges. The tanks must wait until the two previous steps are successfully completed before they can even think about crossing. Once a bridgehead is established secure enough to permit engineers to work, the water obstacles will

be quickly spanned and the tanks will be able to cross. Armored support is essential to insure success, and tanks must get across as quickly as possible to support the infantry, to enlarge and strengthen the bridgehead, and to be ready to repulse the counterattack which is sure to come.

Realizing all this only too well, the combat command moved out on its unsavory mission. As it had in the latter part of the second phase, the combat command moved in two columns with the composition very much the same as before. Each column had its route to follow and river crossings to make. If both units were successful, two river crossings were made. On the other hand, if one had difficulty in securing a crossing while the other was successful, both columns crossed at one place and then moved off again in a double column.

As before, the column commanded by the tank battalion commander was led by a cavalry reconnaissance troop. It was followed closely by the light tank company of the tank battalion, and attached to the light tanks was a platoon of tank destroyers. Immediately behind the light tanks and tank destroyers came a platoon of medium tanks, the tank battalion assault-gun platoon, and an artillery battery. The remainder of the fighting elements of the tank battalion followed, and were in turn closely followed by an artillery battalion. Behind came more artillery, headquarters elements, and service units of all types. Attached to the tank battalion was a company of armored infantry, or when the going was expected to be especially arduous, a battalion of infantry from a nearby infantry division. The latter proved to be the wiser of the two arrangements, for a river crossing against stiff resistance for a single infantry company was to give a boy a mansized job.

In any case, the attached infantry was carried on the back decks of the tanks. In the case of the armored infantry company, their empty half-tracks marched with the service elements of the tank battalion. The heavy weapons, however, were placed in the tank column where they were accessible, if needed, to the infantry commander. The infantry battalion's heavy weapons, too, were placed with the tanks.

The setup, as just described, was again able to make excellent progress. An artillery liaison pilot in a cub plane assisted immeasurably by staying always well in front of the column and reporting accurately on what lay ahead. Information from the plane was supplemented by pertinent observations by the cavalry.

The first evidence on the condition of a bridge came from the pilot. In addition, he divulged the presence of enemy and indicated what resistance could be expected. Like a batter getting stolen signals from a baseline coach, the cavalry was forewarned and proceeded cautiously, as close to the bridge site as possible. The reconnaissance element then was able to send back a more detailed report on the condition of the bridge, the status of the approaches to the bridge, and the strength, composition, and location of the enemy. An engineer reconnaissance officer was at once dispatched forward to the cavalry unit where he made his estimate as to what equipment he would need to construct a crossing, where he would build it, and how long it would take him.

In the meantime, the tank battalion with attached units moved forward, deployed, and took positions most protected from enemy fire. The artillery battalion followed suit and went into position ready to bring down all its fire immediately upon call. Light tanks and tank destroyers were sent out to protect the open flanks.

At this point all available information was discussed, since to be forewarned is to be forearmed. A plan was made as to how to reach the river and how to cross the river to establish a strong bridgehead. A thorough and detailed map study of the ground on the other side was then made if it had not been made before; and what to expect and where it would be was considered. Supplementing the map reconnaissance was a personal and visual reconnaissance made from the best observation point available. After everything possible was completed in preparation for the

task ahead, orders were issued for the capture of the bridgehead, order of march in which units would cross the completed bridge, actions to be followed, and objectives to be taken on the other side.

Before launching the attack, as many preliminary preparations as possible were made. All the tanks moved forward to the high ground overlooking the river and took defiladed positions in readiness to support, with direct fire, the infantry effort. The mortar and assault-gun platoons joined the tanks, as did the artillery forward observers. The field artillery battalion began to rain down heavy concentrations in swift swoops on all dangerous-looking areas, and was prepared to fire counterbattery fire once the attack was under way. The assault-gun platoon, together with the mortar platoon, and tanks joined hands with the artillery for the initial preparation on suspected danger areas.

After the infantry commander had gone forward to the cavalry position and had returned with all the information available, the infantry moved out to attack the river crossing and to win a secure bridgehead. Directly supporting the infantry was a platoon of tanks. This small unit virtually married itself to the doughboys and scurried around like a sheep dog tending to his flock. The tanks stayed with the infantry and covered them to the river. By this time, enemy small-arms fire and machine-gun fire was sure to be heavy. The full weight of the fire from all the tank weapons was vital in disconcerting the enemy, and figuratively smoothed the road over which the footsloggers traveled.

On reaching the river or canal, the tanks moved along the banks to lend what support they could to doughboys as they made their valiant attempt to cross the water, as uninviting and costly an obstacle as an infantryman is called upon to hurdle. The tanks, on such a mission, are as vulnerable to antitank fire as a string of ducks at a Coney Island shooting gallery. They took what protection they could, however, from nearby buildings and stone walls. Their presence was a strong morale factor to the infantry. More important, tanks were immune to automatic fire which was so painful and despairing to the infantry. A few well placed tank shots could destroy a machine gun that would take the infantry much time and many lives to overcome. All the while, the artillery forward observer with the tanks was calling for fire as suitable targets presented themselves.

The infantry had the close support of the tank platoon, the artillery, and the remainder of the tank battalion which fired direct from the high ground behind. The doughboys with such backing reconnoitered up and down the river until they found a suitable crossing. The securing of the bridgehead soon followed.

As soon as the bridgehead was strong enough to permit engineers to work in comparative safety, those rough-and-ready, daring jacks-of-all-trades immediately went into their specialty act and began constructing a bridge over the river or canal, whichever was first. Tanks now moved to the bridge site and covered the engineers as they worked. As soon as the span was in place, the platoon of tanks moved across and took positions between the river and the canal. The engineers then put on the finishing touches to the first bridge and moved forward, still covered by the tanks, to work on the next span. As soon as the last bridge was ready, the tanks moved across to the opposite shore and helped strengthen the bridgehead. The crossings were now ready for the passage of the entire column.

The pattern just described could not be followed in every instance. Each crossing presented many new and different problems. There were cases where infantry, with tanks supporting, as described, successfully crossed a canal only to be pinned down completely on the wide strip of land between the canal and the river by heavy enemy automatic fire. Because of terrain obstacles, the tanks could give the doughboys very little effective support from their positions along the canal bank; nor could the armor cross the canal, since a treadway bridge had not yet been placed across that obstacle. As no bridgehead had been established on the far shore, heavy enemy fire prevented the engineers from even commencing to work. A desperate

situation had been born. As the river *had* to be crossed and since the tanks were without a bridge over the defiant canal, one course, and one alone, seemed open, and that was for the infantry to cross at any cost. "At any cost" meant very, very heavy losses.

Situations occurred where determination, courage, and initiative found other solutions. One historic crossing was made possible by a tank platoon leader who fired his tank guns at the banks of the canal to loosen them, only to have his tank get stuck in the canal mud once he got into it. Still not deterred, he had his tank towed back by another tank, and then set to work with fellow members of his platoon to build a ramp across the canal by using logs, rocks, concrete—in fact, anything and everything available. All this was being done under the same fire that prevented the infantry from advancing and the engineers from working. The canal bottom and the tanks offered protection that the other two units did not have. Eventually, one tank crossed the canal over the hand-laid ramp and towed successive tanks across. The platoon shouldered in at once to give the infantry the close support that it so critically needed. As far as the enemy was concerned, that canal-crossing achievement was the straw that broke the camel's back. The infantry soon crossed the river with the tanks covering, and although losses were sustained, the burden was lightened immeasurably by the steel friends. Alas, after crossing the river and with success in their grasp, the infantry once again were pinned down on the opposite shore by strong enemy fire. With the fragrance of one bold, successful accomplishment still in their nostrils, the tank platoon soon found, after a careful reconnaissance, a ford across the river. Once again tanks and infantry were able to team up, and a firm bridgehead soon resulted.

Yet things did not always work that well. On other occasions the breaching of a deep canal without the help of a bridge, or the fording of a deep river, was impossible for tanks. Since the infantry had no close support except what the artillery and the tanks on the high bluff were able to give, the dogged doughboys took the only course open to them. They "grabbed the bull by the horns" and, in the face of withering and dismaying fire, finally made the bridgehead. In doing it that way a great deal more time was consumed, but more important—much more—was the added cost in American lives.

Enemy antitank guns well placed close to the shore could and did limit the movement of tanks, and placed once again the burden on the perpetually weary shoulders of the selfsame individuals, the doughboys.

Before the attack to establish the bridgehead had been made, the tank battalion commander in his orders had divided his battalion and attachments into task forces. The units so organized were usually three in number, built around the medium tank companies and commanded by the medium tank company commanders. To alleviate the added burden upon the company commanders, it was more satisfactory when possible to put a responsible staff officer in charge of each force. Each company had a portion of the infantry attached to it. The battalion assault-gun platoon was assigned to one company, the battalion mortar platoon to a second, and the advance guard artillery battery to a third. The light tank company with attached tank destroyers and cavalry sometimes constituted a fourth task force. Often, however, they were divided up among the other three groups of forces to strengthen and balance them. The battalion reconnaissance platoon together with the battalion command post were usually near or at the most centrally located position.

When the time came to cross the bridges, the teams were formed and crossed the bridges one behind the other. Each group of elements had a specified locale to take on the opposite side of the river. Objectives were the dominating high ground, the locations most valuable to the enemy, and the ones, if they remained in enemy hands, that would cause our forces most trouble. All roads leading into the by now enlarged and strengthened bridgehead were covered by strong outposts, and small villages and towns within the bridgehead were taken by the task

forces in their advance to complete their missions. In the process of reaching their goals, the groups usually met resistance consisting first of infantrymen with small arms and automatic weapons. Before reaching the designated spots, the task forces had to overcome antitank guns and tanks which fortunately were often well scattered. After all objectives had been taken, a large, strong, half-circle of steel extended from the bridge crossing at the focal point.

At virtually all river crossings, the speed of the column and the surprise it effected upon the enemy were apparently the vital factors in the subsequent rapid and successful crossings. Bridges were often blown by the enemy just before the advancing elements reached the crossings and just after fleeing Germans had made final use of the intact spans.

The terrain at virtually every river crossing was perfectly suited for strong, heavy, and prolonged defense. In fact, it was so outstanding that it was a defender's dream. If the Nazis had had time to prepare a planned defense consisting of well placed artillery and cleverly positioned artillery observers ready to rain shells down upon the bridge crossing at the first signs of activity, they could have won for themselves a long delay. Similarly they could have placed their guns in strategic locations covering all approaches, established a tank unit for a mobile reserve, and dug in their infantry and machine guns. A combination like that would certainly have made a river crossing slow, painful, and terrifically costly. Much bloody fighting would have resulted. The losses, heavy as they were, in the actual crossing were insignificant when compared to what they could have been. Without a doubt, a crossing against an established defense would have called for a much more powerful and potent force.

Luckily, the advancing forces reached the bridges so quickly that the defenders, as has been mentioned, had time only to blow the bridges and to defend with what they could. Usually, after the friendly bridgehead was established, an enemy counterattack was launched. It appeared that while the river was being bridged, enemy forces were being gathered in an attempt to drive the attackers back and to destroy their bridge. By the time the Boche forces were formed, the bridgehead was usually too strong. The forces comprising it were sitting squarely astride all the key places which only a short time before could have proved disastrous to the advancing elements had the ground been held by the enemy. It was the same enemy who was trying desperately to win the very same ground, and who was being easily annihilated in the process. Enemy artillery, strangely enough, normally came down more heavily after the bridge was made than before. Once again such an unusual procedure seems to indicate that they arrived too late with too little. It must be emphasized that in some localities the enemy did have what they needed, and could not be dislodged until advancing forces which had crossed at other places routed them out.

After the bridgehead was secure and after the counterattack was quelled, action usually ceased. All elements of the column were then able to cross, the column was formed once again, and it moved off to the next river.

During this, the third phase of operations, the spotlight was held by the river crossings. The memory of them became ingrained in the minds of all members of the column because there were so many rivers, they were so close together, and they took such a tremendous effort and toll to cross. Soon after the last (for the time being) of the rivers had been successfully breached, the column slowed its already mincing steps to a virtual halt to gird itself for the next venture.

The days ahead will undoubtedly uncover much that is new in the ever-changing struggle of war. Already, different methods of employment and new kinds of strategy are being practiced to insure a steady and fruitful advance eastward to the ultimate objective for whose fall the world so restlessly and hopefully waits. Already, inklings of a new phase, a fourth phase, are discernible. But a discussion of it must wait for a later day, a day when history has already recorded the events. May that phase be the last phase.

Basic Y-Formation Advance Guard

MAJOR GENERAL ORLANDO WARD, *U. S. A.*
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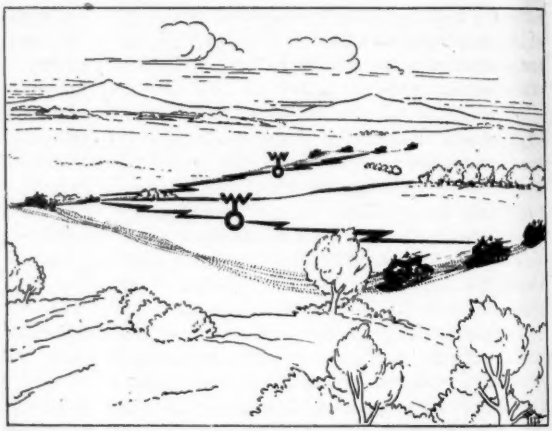
THE object of advance guard is to provide security and to permit the uninterrupted advance of the main body. Before the days of horses no doubt flankers were sent out and told to keep abreast of the point in order to provide broad front information and security for the flanks. As roads developed, the flankers started falling behind the troops on the road and became flank guards. They were unable to keep up with the point which traveled the highway.

Then the horse came into use, and through his greater mobility flankers were able to stay out well to the front and warned the point of approaching danger.

We now find the horse becoming a luxury and a novelty because of the advent of the cross-country, track-laying vehicle. We as always find advance guards moving with a point, advance party, support, and reserve. The point is fired on, the commander rushes to the front, reconnoiters, assembles his commanders, makes his decision, envelops a flank or moves straight ahead (hooks or jabs) in a vain attempt to try to secure the uninterrupted march of the main body. Instructions must be issued to assembled commanders and then the force deployed. All take time.

To use forever the orthodox advance guard column formation does not exploit the capabilities of the full-track, cross-country weapon carrier, be it tank, tank destroyer, or armored infantry transporter. Properly employed, they will provide for the uninterrupted movement of the main body in most situations, provided we do not insist on employing our advance guard in column as we have for the last one hundred odd years.

With vehicles of current cross-country mobility, an advance guard consisting of a light tank company with infantry attached can move in a Y formation, the base or the junction of the Y moving with the conventional



point, advance party, etc., the two points of the Y moving with security detachments, each well ahead of the base of the Y. Radio communication will permit the single envelopment or double envelopment of any opposition met along the route by one or both points of the Y. The information which must be sought for after contact is, through prior deployment, immediately available. In short, the Y advance guard should now be *the* basic one for units of any considerable size. The column advance guard should be the exception except for security of the small units and for the elements of the Y type advance guard. In order to implement this, we should have in all sizeable task forces and in units the size of a division sufficient mechanized cross-country, full-track vehicles to take advantage of mechanization, securing thereby the uninterrupted advance of the main body.

This adds another reason to the long list of why tanks should be part and parcel of the infantry division.

Thirty Thousand Prisoners of War Over the Beach

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THE evacuation of prisoners of war in the Second Battle of France is one of the most startling phases of the military operation. It is one of those functions which normally is taken for granted, like the supply of food and water, and seldom is mentioned unless something goes wrong. However, where whole armies are being captured in-

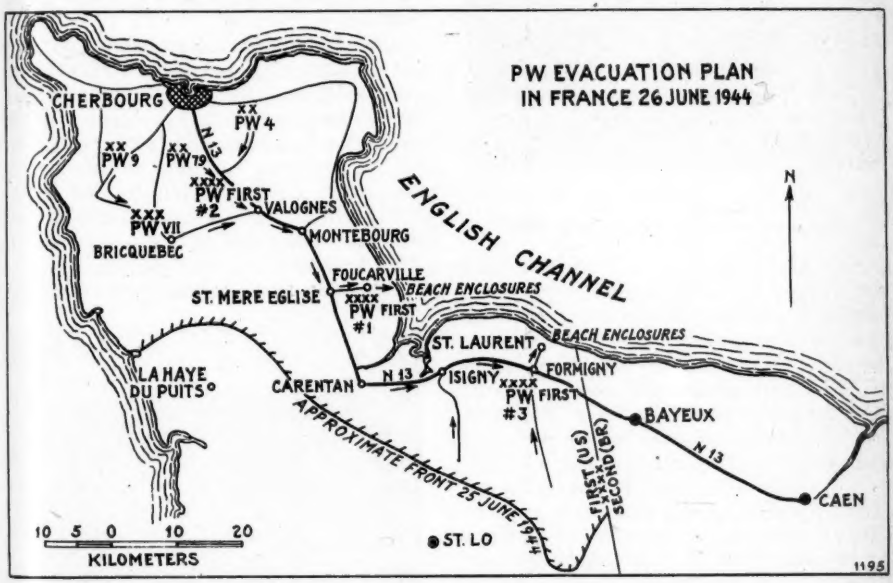

FIGURE 1.

tact, it assumes gigantic proportions and requires careful staff planning and coordination.

This article shows the operation of the PW (prisoner of war) evacuation system in France and England at the beginning of the Normandy campaign and the plans for later developments.

On 25 June the fall of Cherbourg was expected momentarily and First Army was prepared to receive PW's in large numbers from the front. They had constructed a large enclosure north of Valognes (Figure 1) on route N13 which was the main supply road. This enclosure had a capacity of approximately 10,000, was surrounded by barbed wire and floodlights, and had guard towers erected at critical points along the perimeter. The army engineers also had installed a water point in the adjoining stream, had erected two elevated canvas water tanks, and had laid pipelines to each separate area of the enclosure into which the PW's were to be segregated.

As soon as PW's were received here, they were put to work digging latrines and garbage dumps. An interesting story is told in connection with this operation. A German noncom had been ordered to select ten privates to dig a latrine. They were given shovels and started to work. After a short time, the guard noticed one of the PW's (a very young lad) crying while he was digging, and upon

questioning, it developed that he thought he was digging his own grave.

The 4th Infantry Division was driving on Cherbourg from the east, the 79th Infantry Division from the south, and the 9th Infantry Division from the west. Each had established its division PW collecting point and was operating it with part of the organic division MP platoon. Due to the road net, it was not feasible to evacuate PW's from the 9th Division to army enclosure No. 2 at Valognes; therefore, army had given VII Corps one of its MP escort guard companies to operate the corps enclosure at Bricquebec (Figure 1) and to evacuate from the 9th Division. Another escort guard company was used to operate the enclosure at Valognes, and a Ranger battalion was being used by army to evacuate PW's from the 4th and 79th Divisions, using a few 2½-ton trucks. It was found that sixty PW's would fit into one truck and no one objected or expressed a desire to walk. One Ranger rode inside the cab with the driver and observed the truck ahead. One Ranger rode backwards on each of the front fenders observing his own truck. The column was led by a Ranger on a motorcycle and followed by two Rangers in a ¼-ton truck. There were no attempts to escape.

FIGURE 2.
SEARCHING PRISONERS OF WAR IN ENCLOSURE.

As each truck arrived at the enclosure it was halted. An enlisted man from the escort guard company inquired in German if there were any wounded prisoners. (Several trucks arrived with no one in them who could speak German! They were impressed Poles, Czechs, and others.) All wounded were removed to a medical aid station set up in a nearby field where they received fresh dressings and first aid, and were given medical cards showing diagnosis, treatment, and recommendations for further treatment required during evacuation. After this was completed, they were placed in the stockade with the others. Those requiring hospitalization were removed to a field hospital in the vicinity and further evacuation was accomplished through medical channels.

Next, the PW's were segregated by rank and a head count was taken. When trucks were available, the PW's were evacuated with Ranger guards to the Army PW enclosure No. 1 at Foucarville (Figure 1). This was the first army enclosure constructed and was within short marching distance of the three enclosures on the beach. Rangers were used also to evacuate the PW's from the VII Corps enclosure to army enclosure No. 1.

The enclosure at Foucarville was very similar to the one at Valognes except that no water system had been established, so water had to be carried in cans. A medical installation was set up nearby, and took care of wounded PW's in the same manner as the one at Valognes.

FIGURE 3.
PRISONERS OF WAR READY TO BOARD AN LST, SEEN FROM THE SHIP.

Here the PW's were searched by the escort guard company that operated the enclosure (see Figure 2). They were then interrogated and rosters were prepared for their move to

the beach. Segregation was maintained at all times.

When word was received that one of the beach enclosures was empty, PW's were marched down from Foucarville to the beach with Ranger guards who were supplied with a roster showing the PW's name, rank, and serial number. This roster served as a passenger list for shipping (see Figure 3) and was forwarded with the guards as far as the "distribution" enclosure in England.

The beach enclosures had "Lister" bags erected in them, and all enclosures were stocked with food in the form of "C" rations, which were fed to the PW's at 1000 and 1600 wherever they happened to be at those hours.

Down in the southern sector, very few PW's were being taken. The main effort was on the north against Cherbourg, and this resulted in lessened activity in the south. The First Army had broken up one of its escort guard companies and attached a section to each of the front-line divisions operating there. With this extra attachment, the divisions on the southern front were made responsible for evacuating their own PW's to the beach north of their respective sectors.

Three LST's (landing ships, tank) were earmarked originally for the evacuation of PW's from the far shore after their initial trip across. (This phase of the plan was soon changed, however, and PW's were moved across the Channel in any ships that were available.)

A PW enclosure was erected at one of the ports in southern England and designated as the "reception" enclosure (see Figure 4). Here the PW's were taken from the boats and held until they could be evacuated by rail to the "distribution" enclosure (Figure 4).

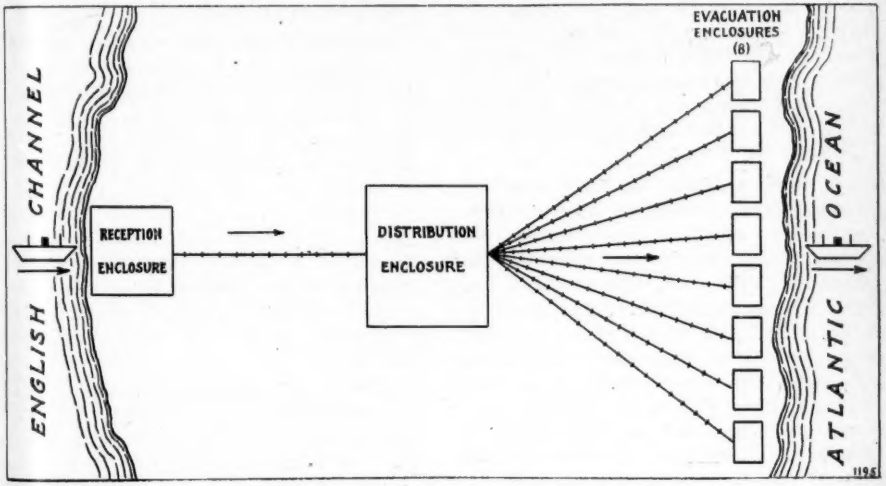

FIGURE 4.
FLOW OF PRISONERS OF WAR THROUGH ENGLAND.

The site selected for the reception enclosure was next to the railroad and close to the docks and "hards" to minimize the guard problem. This enclosure was constructed by engineers and was divided into several separate stockades to maintain segregation. Latrines were constructed and mess and medical facilities were provided. No housing was erected, however, due to the fact that the PW's only remained there a matter of hours.

This enclosure was surrounded by a barbed-wire fence and was designed to accommodate about 1,000 PW's, although double that number could be placed there for short periods

if necessary. Covered guard towers were erected and were equipped with spotlights.

Arrangements were made with the Transportation Corps to operate four trains daily if necessary between the reception and distribution enclosures.

The site selected for the distribution enclosure was an existing British Army installation centrally located in southern England. Here the conventional fence and guard towers were erected and the area subdivided into compounds. Existing facilities were used for processing, messing, and housing. A request was put in for the construction of a railroad siding near the enclosure to avoid marching the PW's through the adjoining village. This request was denied. The distribution enclosure had a capacity of approximately 3,000 PW's and could receive and evacuate 2,400 per day.

Upon arrival there, the PW's were questioned, searched, disinfested, fed, given necessary medical attention, and provided with clothing if needed. After this phase was completed, the PW's were moved into a large room (fifty at a time) where there were fifty tables and fifty German-speaking searchers. There they were completely stripped and everything they had was placed on the tables. Clothing to be disinfested was tied in a bundle and tagged with the PW's number for identification. The PW was given the other half of the tag, bearing the same number, for a claim check. Personal articles which the prisoner was allowed to keep were left on one end of the table and all other articles were confiscated. The PW was then given a small white bag which he retained and in which he placed his personal articles.

From this point the PW's moved on to the next room where they were checked for communicable disease and body lice. Those having a communicable disease were processed separately and those having body lice had a mark painted on their chests with mercurochrome. Then they moved into another room, were counted, and those having the tell-tale mercurochrome were segregated. The latter group (about ten percent) were required to shave off all body hair with an electric shaver, assisting each other, and after inspection, each had to take a fifteen-minute shower. The others took five-minute showers. Upon completion of this phase, they claimed their clothes (which had been disinfested by a quartermaster unit using gas chambers), got dressed, and were ready for a meal and some rest.

Italian PW's were used for much of the labor involved. It was found, however, that the Italians in the mess hall required close supervision or they wouldn't give the Germans enough to eat!

From the distribution enclosure, the PW's were shipped to "evacuation" enclosures. Eight of these evacuation enclosures (Figure 4) were established throughout England, using existing British installations wherever possible. As shipping became available, these enclosures were emptied and new batches of PW's were routed in from the distribution enclosure. This, of course, required centralized control which was established in the PW Division of the Theater Provost Marshal's office. These movements were all made by rail through the cooperation of the Transportation Corps.

Here at the evacuation enclosures the following functions were performed. All PW's upon arrival were searched again to remove any contraband articles they might have obtained en route. They were given physical examinations, and the necessary vaccinations and inoculations were accomplished and recorded. A prisoner of war processing company or one of its platoons processed the PW's, using PMG Form 2-1 (the short form); and they were assigned PW Internment Serial Numbers. This form was made out in duplicate (one copy to the PW Information Bureau, and one copy to the commander of the guards accompanying the PW's). However, if time permitted, PMG Form 2 (the long form with photograph of PW) was accomplished in triplicate and distributed as follows: one copy was turned over to successive guard commanders accompanying the PW, and the other two copies

were sent to the Prisoner of War Information Bureau.

In addition to this, each PW was given both sections of WD PMG Form No. 6 to fill out. One half of this form consists of a post card addressed to the International Red Cross at Geneva, notifying them of his identification, state of health, capture, address, etc. The other half of the form is a post card which he addresses to his family giving essentially the same information. These forms when completed were forwarded to the Prisoner of War Information Bureau. Additional clothing, if required, was furnished, and the PW's were given certain canteen supplies. Also they were allowed to write letters on the special stationery provided for their use.

When the time came for shipping the PW's to the United States, a tentative roster was submitted to the Theater Provost Marshal for approval. The final approved roster was then prepared (forty-five copies), alphabetically by rank, giving name, rank, and Internment Serial Number, with fifty names on a sheet. Distribution was made as follows: twenty-seven copies to the PW Division and eighteen to the escort guard commander, who gave ten to the ship transport commander, three to the U. S. Army port commander, three to the British port commander, and two to the commanding officer of troops for receipt and return to the commandant of the evacuation enclosure.

Let us now look at the allocation of troops that made this system work. There were three military police prisoner-of-war processing companies in the theater, consisting of three platoons each. One platoon was assigned to each of the eight evacuation enclosures and the remaining platoon was shuttled between enclosures to meet the varying demands for processing.

Nineteen military police escort guard companies were assigned to the theater and were allocated as follows:

6 Companies to First Army.

1 Company to 6th Engineer Special Brigade to operate their beach enclosure.

2 Companies to 1st Engineer Special Brigade to operate their beach enclosures.

3 Companies at reception enclosure:
1 to guard LST's (landing ships, tank) operating across the Channel.
1 to operate the enclosure itself.
1 to guard the four daily trains to distribution enclosure.

3 Companies at distribution enclosure to operate it and guard trains to evacuation enclosures.

3 Companies to advanced section, communications zone, which did not function as such until a later date.

1 Company distributed at ports in southern England to pick up PW's landed elsewhere than at designated ports.

In addition to the nineteen military police escort guard companies authorized for the theater, the War Department established a pool of twenty-one companies based in the zone of the interior which were used to receive and guard PW's at the evacuation enclosures and serve as boat guards across the ocean. Fifteen companies were sent to England and six remained in the United States, receiving the PW's at the ports and guarding them on their way to PW base camps. Every time a company or major portion thereof arrived at a port in the zone of the interior, one of the six companies in the zone of the interior was sent to England to replace it.

General Reckord, the Theater Provost Marshal, could see a waste of manpower in this plan, as escort guard companies might be waiting at an empty evacuation enclosure for a considerable period of time, pending the arrival of PW's. He therefore requested permission from the War Department to use these companies to pick up the PW's at the distribution enclosure and guard them en route to the evacuation enclosures. This permission was granted and the system placed in operation.

This entire evacuation plan had been so carefully worked out that only a few very minor changes had to be made after D-day.

The Theater Provost Marshal had studied the tactical plan and obtained estimates of the number of PW's that would be taken. The estimates ran from 25,000 to 50,000. The actual number taken was 30,000. All the PW installations in England had been prepared and manned and were ready to operate on D-day.

It is interesting to note that First Army was evacuating PW's simultaneously by three different methods of operation. Some were being evacuated in the normal manner from division collecting points to army enclosure; some from division to corps and then army enclosure; and in another sector they were being evacuated by divisions direct to the beach, bypassing army entirely. Each method had its merits and fitted the local situation for which it was adopted.

In order to have this flexibility it is necessary to centralize control at the army level, and it appears that the present policy of attaching military police escort guard companies to the field army for disposition is the proper solution.

It is believed also that the proper place for complete administrative PW processing is the communications zone. This administrative phase can be accomplished with far less difficulty in a semipermanent installation than in the middle of an open field.

Upon the opening of Cherbourg for Allied shipping, it was planned to evacuate PW's direct from there to the United States. A "central" enclosure was to be set up on the Continent and operate similarly to the distribution enclosure in England except that processing would take place there and many PW's would remain on the Continent organized into labor companies, located at labor camps. This, of course, meant closing down all the United States PW installations in England, opening new ones in France, and moving the troops to operate them on a well-planned time schedule.

The efficiency of the entire evacuation system, both in England and France, may be attributed to those same two factors we hear of so often—*advanced planning* and *staff coordination.*

More Information on the Flying Bomb

From an article in *The Sphere* (Great Britain).

THERE is only one complete flying bomb in this country. It crashed in southern England a short time ago without exploding.

Contrary to popular belief, the distance traveled by the flying bomb is not controlled by the amount of fuel carried, nor does it start to dive when the engine stops because of a shortage of fuel. There is a "windmill" in the flying-bomb's nose with two six-inch blades. This revolves under the pressure of the air through which it is driven. The number of revolutions it makes are recorded on an electric counter. When a certain figure is reached, to which the counter has previously been set, the elevator control is automatically locked in a position which sends the bomb into a steep dive.

Three percent of the flying bombs were fitted with a minute transmitter and trailing aerial. The continuous transmission sent out from the bomb during flight could be picked up by enemy wireless stations, and its position plotted by radio-direction finding.

The complete bomb, full of fuel and ready for launching, weighs 4,700 pounds or slightly over two tons. The warhead contains nearly 2,000 pounds of high-explosive, and the fuel tank holds 150 gallons. A 600-horsepower engine gives a flying speed of 350 to 360 miles per hour. The bomb's course is set before launching on an automatic pilot controlled chiefly by a gyroscope. The flying height is also set beforehand on an aneroid barometer connected to the automatic pilot. Operating heights of over 10,000 feet are possible, but few bombs were met over 5,000 feet, and the majority flew at about 2,000 feet.

Organization and Maneuver of Field Artillery Observation

COLONEL PERCY W. THOMPSON, *Field Artillery*
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THE development of rapid methods of fire direction, reliable mechanical means of transportation, and the portable transmitting and receiving radio sets has solved many basic problems of the field artillery in gunnery, transportation, and communication. This has served to focus the attention of field artillerymen upon the primary problem of observation. This is shown by an extract from a letter by a battalion commander written during the Tunisian campaign and published in *The Field Artillery Journal* for July 1943:

"We can handle any situation if we have an observer in the area. In our last battle we had three forward observers; three liaison officers, observing from infantry battalion observation post; three battery commanders supplementing the forward observers; one battalion observation post which was increased to two before the battle was over. That makes eleven observers and in a pinch I use the assistant communication officer as a battalion observer. . . Our air OP's are coming now, and I think we will find good use for them. Heretofore we have had such excellent ground observation, the air OP's seemed unnecessary, but when we work our way forward onto the flat plain country they will be needed also."

It seems from this that the problem of close support of the infantry and other assault troops has become principally the problem of organization and maneuver of observation.

THE LIGHT ARTILLERY BATTALION, INFANTRY DIVISION

First, let us consider the direct-support battalion which has the greatest problem of observation. It must observe the entire zone of action of the supported unit. In this zone it must give general surveillance of the zone to the front, flanks, and in some situations to the rear, and also it must have observers far enough forward to be in close touch with the needs of our front-line infantry. This observation mission is accomplished by establishing two types of observation posts: (1) battery and battalion observation posts which give general surveillance, and (2) forward observation posts which are closely linked with the forward elements of the supported unit.

Means.—Under the present tables of organization the battery is considered capable of organizing and maintaining one battery observation post and putting out two forward observer parties. The battery commander establishes the battery observation post and, during hours of visibility, is normally at this post. The battery reconnaissance officer and the assistant executive are used as battery forward observers.

In addition to the observation established by the howitzer batteries, the battalion is normally able to man one observation post constantly and may organize others on an emergency or part-time basis. While observation is not the primary function of the battalion liaison officers, they are often in a position to observe, and in many cases send in more good targets than do the forward observers. The battalion also has two organic liaison planes with officer-pilots, which are battalion air observation posts.

General Scheme of Observation.—How is the battalion commander to use these means put at his disposal to the best advantage? Any system adopted must give the battalion the greatest amount of control, yet be flexible enough to adapt itself to the varying conditions of rapid movement and possible decentralization of the battalion effort. The system of observation used must place responsibility upon subordinate commanders and enlist the initiative and ingenuity of all ranks. To accomplish this, the battalion commander assigns each battery a zone of observation. In its assigned zone, each battery is responsible

for gaining the best general view of the zone and the one that will extend observation as deep as possible into the hostile territory. The only method of specifying a zone of observation that will work in warfare of movement is to assign each battery the mission of

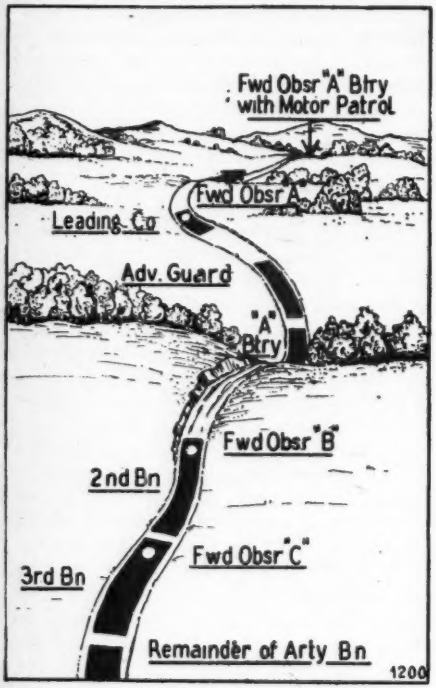

FIGURE 1.

COMBAT TEAM IN ROUTE COLUMN, ADVANCE TO GAIN CONTACT.

observing in the zone of action of a certain infantry unit. The mission announced to the battery is "to observe in the zone of action of the —nth Infantry Battalion or —nth Infantry Regiment." Such a mission, unqualified, means that the battery will establish one or more observation posts which will give general observation of the zone and that the battery will supply the necessary forward observers to that infantry unit, usually an infantry battalion. Should the battalion commander desire that the battery furnish forward observers to any other infantry unit, he will give detailed instructions as to when, where, and to whom they are to report. There are many advantages in giving batteries definite observation missions: (1) the battery commander is obliged to seek the best general observation of the zone—this decentralizes reconnaissance for observation; (2) observation is maintained by reconnaissance of battery commanders in relation to changing situation; (3) the battery has definite responsibility with respect to forward observation. Examples of this type observation missions are given in Figures 1-4.

Figure 1.—Combat team in route column, advance to gain contact. The leading battery provides two forward observers for the advance guard. One marches with the leading

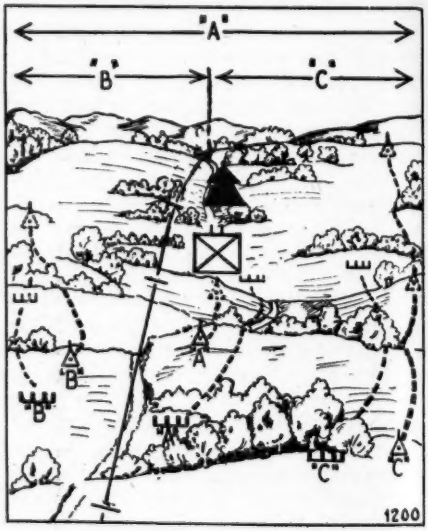

FIGURE 2.

APPROACH MARCH—NARROW FRONT. INFANTRY IN COLUMN OF BATTALIONS.

company, the other with the battery commander's party at the head of the reserve or the tail of the support; or if the advance guard has a motor patrol, the observer should be with it. Each battery in the main body should have one forward observer with

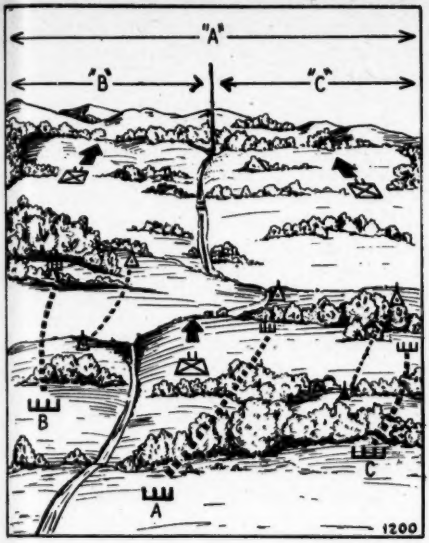

FIGURE 3.

APPROACH MARCH—WIDE FRONT. INFANTRY ADVANCING WITH TWO BATTALIONS ABREAST.

its corresponding infantry battalion. Additional forward observers as directed by the battalion commander join these battalions prior to entry into combat. It is desirable to have these forward observers join these battalions in their assembly area in time to hear the orders of the company commander with whom they are to act.

Figure 2.—Approach march, narrow front, infantry in column of battalions. One battery is given the mission of observation in the zone of advance of the leading battalion; the other two are given the mission of observing to the right and left flanks respectively. Battalion would probably not establish an observation post until opposition has been encountered.

Figure 3.—Approach march on a broad front. Two batteries should be given the missions of observing in the zone of advance of the two leading battalions respectively, and to the exposed flank. The third battery should be given the entire zone of advance with special attention to the most dangerous flank.

Figure 4.—Direct support of infantry regiment. If the situation is offensive, the right and left batteries could be given the mission of observing in the zone of action of the right and left front-line infantry battalion respectively; the center battery could be given the mission of observation over the entire zone of action, or the center battery could be given the mission of observing to an exposed flank or reinforcing the observation in the zone of action of the battalion that has the more difficult ground or any combination of these missions.

If the situation in Figure 4 is defensive, the above scheme could be used, but because there will be more time to make a close study of the observation available, zones of observation may be more accurately delimited on the ground and may not necessarily cor-

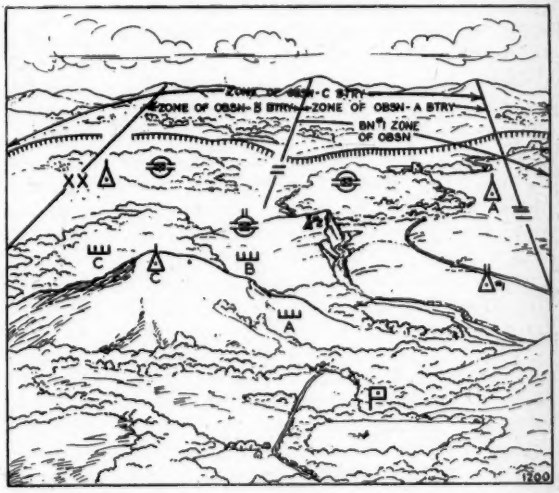

FIGURE 4.

ZONES OF OBSERVATION. LIGHT FIELD ARTILLERY BATTALION IN DIRECT SUPPORT OF INFANTRY REGIMENT.

respond to the sectors of the subordinate infantry units.

Detail of Forward Observers.—Forward observers should be detailed on the basis of one per front-line infantry company or similar unit. Since the battery can normally furnish only two forward observers with parties, and there are three rifle companies in each infantry battalion, it may be necessary at times, depending on the terrain and nature of the operation, to detail additional forward observers. This should be done by the artillery battalion commander, who may find it necessary to detail officers of service battery or headquarters battery for this duty. As a last resort, battery executives, battery commanders, or battalion staff officers may be required to act in this capacity. This should only be necessary if the battalion is operating as part of a combat team. When operating as part of the division or larger force, the battalion can expect reinforcement of the forward observer personnel from general-support and attached artillery. This will be discussed later.

Howitzer batteries must supply relief for their own observers and parties without reminder from battalion. Other officers specially detailed for this duty by battalion should be relieved by battalion.

The battalion commander controls the forward observers initially by orders to the battery commanders or by orders direct to the observer. Usually, forward observers from the howitzer batteries receive their initial orders through the battery commanders; other forward observers receive their initial orders from the battalion commander or through a battalion staff officer. In going to the infantry units he has been detailed to work with, the forward observer reports to the artillery liaison officer at the infantry battalion command post. Thereafter, he receives further instructions from the artillery battalion commander through the liaison officer, or in the absence of orders from the battalion commander he is guided by instructions from the liaison officer.

Maneuver of Observation.—The battery maneuvers its observation in accordance with the situation so as to give general surveillance of the zone of observation. The battery commander notifies the artillery battalion commander (command post) when and where he intends to displace his observation post.

Battalion observation posts are established, abandoned, or moved by the battalion commander as the situation dictates. Generally, a battalion observation post is established at a point giving the best general view of the regimental zone of action or sector. Other battalion observation posts are prepared and occupied as necessary to take care of situations that may arise, such as the exposure of a flank, a penetration of the defensive system, the coordinates with a flank unit, etc. The battalion commander should plan to form a common observation post with the infantry regimental commander for joint use during critical periods of an attack or defense.

Forward observers after being committed to action by the batteries in accordance with the instructions of the battalion commander are maneuvered by the liaison officer who is in close contact with the infantry battalion commander and in communication with the forward observers. Figure 5 gives an example of the maneuver of forward observers by a liaison officer. Observer with "C" Company is ordered to go with "B" Company. Observer with "A" Company observes for holding attack.

The battalion commander must keep a reserve of observation on hand. Usually this reserve will consist of an officer and party made up of some member of the battalion staff and enlisted men from headquarters battery. This reserve observation party is used wherever the battalion commander finds need for it. Examples of its use: to fire a special mission, no other observer being in position to fire on the target; a sudden threat on the flank might call for a special observation party; to reinforce the observation of one of the infantry battalions, the need of which was not previously foreseen; to replace a forward observer and party that had been captured or otherwise had become a casualty; to accompany a special counterattack force; to man an emergency battalion observation

post or for any emergency reconnaissance mission. As soon as this reserve observer is used, the battalion commander must cast about to find another observer and party so that the next contingency can be met with dispatch.

Air Observation.—Every battalion of field artillery is provided with two light-weight unarmed and unarmored airplanes of slow cruising speed, operated by field artillery personnel and capable of taking off and landing in small fields or on roads. During the advance toward the enemy in route column or during the approach march these planes are used for reconnaissance and observation. The flight pattern for this type of mission is usually a figure eight with the long axis perpendicular to the line of march and extending far enough to the flanks to permit observation to about five miles. The plane may fly several miles ahead of the advance guard or other leading reconnaissance elements. If the situation is vague, these flights will probably be scheduled missions every hour or half hour. When the situation crystalizes and warrants, a plane may be kept aloft constantly to keep surveillance to the front, flanks, and rear and to be ready to observe for any fire missions.

Flights.—Flight will be made from landing fields in rear of the main body. As the column advances, new advanced fields will be picked and prepared by air-section personnel. As soon as the artillery is committed, a field located from one to two miles in rear of the battalion position area is desirable. Planes operate from this field as soon as it can be established.

After action develops, it may be necessary to keep one of the planes in the air constantly. If such is the case, one plane will stay up until its gasoline supply is almost exhausted; it will then be replaced by the other plane.

The Direct-Support Group

The direct-support group is usually composed of two light battalions commanded by the organic direct-support battalion commander. Such groups are usually formed for large-scale offensive operations. Forward observers should be provided in equal numbers by the two artillery battalions. This will give four forward observers and parties for each infantry battalion. The liaison officer therefore has a forward observer and party for each rifle company and one observer and party in reserve. The liaison officer would not necessarily distribute these observers in this manner. Initially, at least, it will probably be desirable for the forward observers of the newly arrived battalion to work in pairs with the forward observers of the direct-support battalion in order to become better acquainted with the infantry they must work with and to learn the terrain. During the attack, the liaison officer may continue to use the observers of both battalions in pairs. This has the advantage of allowing one observer to watch the forward movement of the infantry while the other observer of the pair moves forward with the support echelon of the infantry. This is called leapfrogging observation (see Figure 6). It insures observation while troops are advancing to the assault

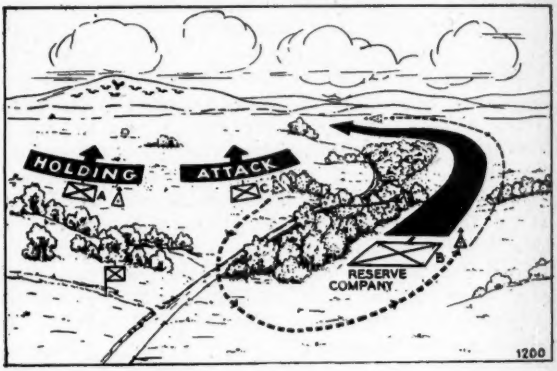

Figure 5.

Maneuver of Observation.

and provides an observer for early occupation of the captured terrain, making artillery support immediately available against counterattack. In more stabilized conditions, these pairs form an automatic relief for each other. During the reorganization and consolidation of the ground by the infantry, the liaison officer may break up these observer pairs in order to distribute close-in observation over the entire front of the infantry battalion.

General-Support Battalions, Infantry Division

The medium battalion of the infantry division and any other battalions attached to the division and given the mission of general support establish battery and battalion observation posts to observe the entire zone of action of the division. Such battalions should pay particular attention to discovering observation into the zone of action of the infantry regiment making the main effort of the division. They should coordinate their observation with the direct-support battalions, especially the direct-support battalion of the infantry unit making the main effort. General-support battalions should endeavor to gain flanking observation that will look deep into enemy territory and overcome his forward defilade. When given the mission of general support with reinforcing mission, the organic division medium battalion should habitually furnish additional forward observers to the reinforced battalion. Light battalions temporarily in general support when ordered to reinforce the fires of a direct-support battalion would not furnish additional forward observers unless ordered to do so by division artillery.

In the defense, general-support battalions are less apt to be given reinforcing missions by division artillery. However, this is one way to bolster a weak flank or give aid to a direct-support battalion that has a difficult sector with respect to observation. The weaker the sector in good ground observation the more that sector is likely to be the object of enemy penetration and the more the direct-support artillery of that sector will need reinforcement in observation as well as fires. In the defense, all units must dispose their observation facilities in depth; yet comparatively, the observation of the direct-support battalions will be disposed forward—from in front of the forward defensive areas to the main line of resistance. It is the general-support battalions that must organize most of the observation in rear of the main line of resistance.

Coordination of Observation by the Division Artillery Commander

The division artillery commander coordinates the artillery observation in the division zone of action to insure that the entire zone of action or defensive sector is observed by one or more observing agencies. The direct-support missions include the mission of observation in the zone of action of the supported units. The mission of general support implies the missions of observation over the entire zone of action of the supported major unit. When the division has a general-support group, the general observation mission of the group should be divided between its battalions according to their zones of fire and any reinforcing missions. If dominant ground suitable for observation is scarce, the division artillery commander allocates ground suitable for observation with priority to (1) direct-support battalions, (2) flash sections of the observation battalion, (3) general-support battalions.

On the offensive, the division artillery commander will be particularly concerned that the direct-support battalions are reinforced by sufficient forward observers from the general-support battalions, and that the possibilities of flank observation in the zone of action of adjacent units is fully exploited by both direct and general-support battalions. Often during an offensive operation, one regiment will capture dominant ground which will give excellent observation into rear of enemy positions in front of adjacent units. The division artillery commander must advise the artillery of the unit held up of the possibilities for flank observation on the newly captured terrain.

On the defensive, the division artillery commander must pay particular attention to the coordination of observation in depth.

Adjacent direct-support battalions (or groups) should establish common observation posts. This is one of the most practical ways of gaining speedy lateral coordination between direct-support units. This coordination

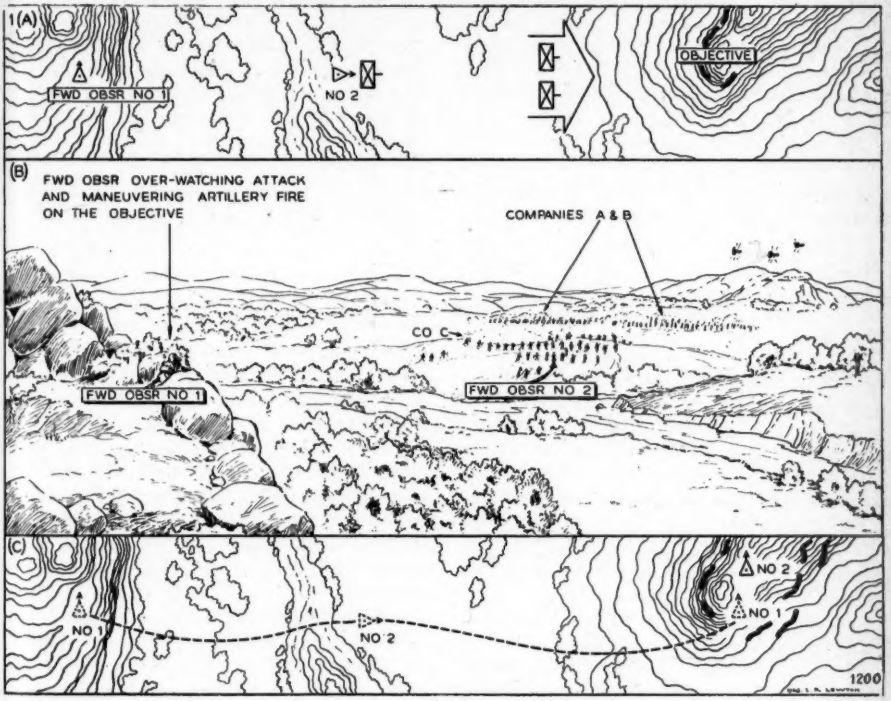

FIGURE 6.

LEAPFROGGING FORWARD OBSERVERS.

strengthens the position at its point of known weakness—the boundary between units.

THE OBSERVATION BATTALION

The observation battalion is the principal agency of corps artillery for counterbattery intelligence. Its organization is sufficiently flexible to permit attachment of elements to divisions. It is organized to execute two types of observation: flash and sound ranging.

The observers of the flash-ranging units are equipped with special flash-ranging equipment. They should be placed in position early. The time required for survey and installation of the flash-ranging base will vary with the survey control and the terrain. For purposes of planning, it may be assumed that the establishment of an initial short-base flash observation post will require from thirty minutes to an hour. Expanding the initial short base into a standard flash-ranging base will require from four to ten hours.

Sound ranging is difficult or impossible during thunder storms, on very hot days, or in a wind of more than twenty miles per hour blowing across the microphones or from the microphone toward the sound source. Conditions are ideal for sound ranging when the atmosphere is homogeneous and at rest; for example, on a still night, in a light rain, or in a fog, or in general when visual ob-

servation is least effective. The time required for survey and installation of the sound-ranging base by approximate methods will require from one to two hours. Expanding the initial sound base into a standard sound-ranging base will require from five to twelve hours. The standard sound-ranging base is from eight thousand to ten thousand yards long and is generally located between three and five thousand yards in rear of the front lines.

When a division is acting alone or the corps is operating on such a wide front that the division must assume its own counter-battery, the corps will usually attach a battery from the observation battalion to it. A division having an attached observation battery usually employs it as a unit under division artillery control to provide counter-battery information and long-range observation. When a division is acting by combat teams as in the early stages of a meeting engagement, flash elements of the observation battery are usually attached to the light battalions, the sound section being attached to the medium battalion. The observation battery when so attached is one of the greatest observational assets of the division artillery commander. Every consideration should be given to its early employment.

Some Notes from the Cotentin Peninsula Operation in France

WATER was abundant throughout the area, and the 1/50,000-scale map proved a reliable guide for locating water-point set-ups. Normally, three water units were in operation, with one in reserve. Forward water points were established well forward, in the general area of the division medium artillery, in order to give combat units maximum service. This also reduced the amount of traffic and the target which vehicles in roads offered to enemy aircraft and artillery.

Gasoline consumption averaged 4.4 gallons per gas-consuming vehicle per day. This average is slightly greater than in Sicily, due to the fact that a greater use of vehicles was made possible in Normandy by the favorable terrain . . .

Due to the short campaign and favorable terrain, wear and tear on motor equipment was no greater than that encountered in garrison . . .

Great use of small arms, especially Browning automatic rifles and 81-mm mortars, produced an unprecedented rate of repair and replacement . . .

Evacuation of casualties was rapid and very efficient. The majority of the wounded were evacuated from battalion aid stations within an hour of being injured. The cover offered by hedgerows aided medical units greatly, and shortened litter hauls. The litter jeep was especially useful in this campaign on the numerous farm roads in transporting patients to ambulance collecting points. Evacuation was persistently harassed by enemy snipers.

A field-hospital platoon was usually established in close proximity to the clearing station. This proved valuable in the disposition of seriously wounded cases unable physically to be transported to evacuation hospitals.

The Division Psychiatrist supervised the handling of all combat exhaustion cases. It was found possible to return forty-three percent of these men to their original duty.

The towed 75-mm howitzer (pack) which can be towed, transported in a truck, packed on mules, or carried by hand for short distances, is best adapted for use as an infantry accompanying weapon, and should be adopted.

Tanks must fire direct fire and be capable of indirect fire; the artillery must fire indirect fire and be capable of direct fire.

—Major General E. N. Harmon

Supply Problems on Leyte

COLONEL FRANK E. GILLETTE

FROM time immemorial the average Leavenworth student has sought rules of thumb, "normal distance" graphs, and templates for the solution of such problems as location of artillery positions, reserves, and supply installations. He has attempted to compile tables in which he could find the answers to all logistical problems. He has spent good money for manuals, charts, and guides in a quest for an easy and universal solution to the "curved balls" thrown during marked exercises.

This article portrays one situation in which *nothing* was "normal" and to which no rules applied. It was a case in which the unusual was the standard and in which the impossible became the everyday reality that had to be overcome on the ground regardless of theory. No instructor ever perpetrated such a requirement on hapless students, nor did any student ever offer such a solution in the history of the Command and General Staff School.

This is not offered as an "approved solution" but it is the story of a solution that did work in combat in spite of all difficulties and in direct violation of many school-taught methods. Secrecy prevents disclosure of many details, but it is hoped that the general nature of the difficulties overcome will be readily apparent in the succeeding paragraphs.

The story of the XXIV Corps supply problem on Leyte is primarily one of distances, of transportation, and of rain. The distances were great, the transportation inadequate, and the rain incessant.

To furnish an understanding of the "Special Situation" it will be necessary to outline briefly the general difficulties already encountered and enough of the tactical situation to present the immediate logistical problems facing the 7th Infantry Division during its attack north from Baybay (see Figures 1 and 2).

During the planning phase the corps staff faced the usual difficulties inherent in any amphibious operation—lack of service units, lack of shipping, and changes in plans. The theater was short many service units considered essential. These were mainly engineers, ordnance maintenance units, graves registration units, military police, quartermaster truck and service companies, and port operations units. After much discussion and some compromise the adjusted list was turned

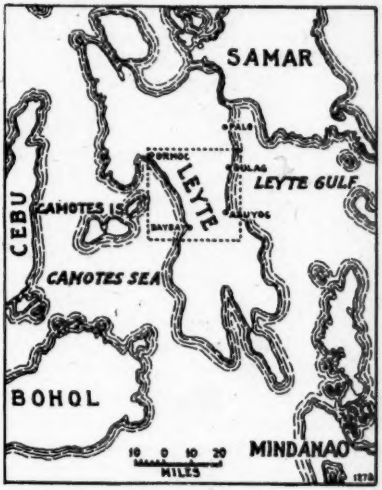

FIGURE 1.
AREA WITHIN DOTTED LINES IS SHOWN ON A LARGER SCALE IN FIGURE 2.

over to the Navy, which was so short of bottoms that a battalion of 155-mm howitzers had to be left behind. At the time, this was not considered too great a loss due to the limited size of the target island. However, when the locale was changed to Leyte the omission was regretted, as this unit could have been used to excellent advantage on the larger land mass.

The difficulties incident to the loading phase were "normal." These involved the substitution of ships, and the discovery that some ships' holds had been altered. Changed time of arrivals necessitated changes in an already complicated transportation and loading schedule.

The final and major change in plan (the operation on Leyte as part of the Sixth

Army) came the day before sailing. Since everything was loaded, there was nothing to be done except to hope that the units and supplies carried would fit the new mission and the new target area.

The debarkation phase also involved the normal difficulties (normal because they have been encountered on every amphibious operation so far conducted). Skippers rushed the unloading of ships. Some units were not landed on the proper beach. Supplies were thus scattered over the entire beach area. Upsets in loading priorities caused the discharge of some service units prior to tactical units, ammunition before weapons, etc. The worst example was the unloading of the corps headquarters ship. It had been planned to deliver the advance party, the forward echelon, and the rear echelon equipment to the beach in that order. However, a change in plan (due perhaps to lack of landing boats) necessitated unloading of the entire ship into an LST. This resulted in unloading in exactly the reverse order than that planned, since everything in the bottom hold came out on top of the [illegible] and arrived at the beach first. The scramble for badly needed equipment during the first twenty-four hours can be imagined. No solution for these difficulties can be offered in an article such as this. A subordinate commander or staff officer is helpless in an attempt to alter such a situation.

Turning now to the tactical phase we come to the situation facing the corps and division commanders and logistical staff officers during Phase II of the operation. This phase began when the corps beachhead had been secured. The X Corps to the north of the Binahan River (just off the top of the map, Figure 2) was progressing satisfactorily. The 96th Division had captured Dagami and had overcome, at some cost, a beautifully conceived and executed defense line in the hills west of that town. The 7th Division had captured Burauen and was still advancing against considerable resistance to the west. At this time the 11th Airborne Division was made available to the corps commander and was ordered to relieve the 7th. It was felt that the 11th with its air-drop facilities and experience could make more rapid progress in the increasingly difficult terrain of the foothills than the standard division which had to build roads across rice paddies in order to support its advance.

The 7th Infantry Division was ordered to move via Dulag and Abuyog to secure the mountain road from Abuyog to Baybay and then attack north on the west coast from Baybay in the direction of Ormoc.

The movement of the division was a major task in itself. Dulag was ten miles from Burauen. By this time the real rains had started and the road was next to impassable in spots. What had been a fairly good road (by Philippine standards) in dry weather, had become a quagmire. It had been used as the MSR (main supply road) for the division for some time, and was now being used in addition by the aviation engineer units working on four airfields and by numerous service units bivouacked along the road in every available space not under water (and in some that were). Division engineers had fought a valiant battle. They had served their division well, but the load was now too great and it was time for army engineers to take over. Loads of gravel, hauled five miles, had been poured into the bottomless holes with slight visible results. There was no place to drain the water standing on the road as long as the rains kept the streams flooded. Traffic control became an increasingly difficult problem. There was much unnecessary driving. Sightseers were numerous. The corps commander caught one officer making a trip on a road scraper. Service units hauled men a hundred yards to mess. Units bivouacked along the road failed to construct culverts at their access points, which resulted in tearing down the shoulders of the highway and ruining the already poor drainage system. Drastic measures were promptly placed in effect. One-way traffic was ordered over the worst spots. The trip to Dulag began to take four hours.

But this was only a starter. The road from Dulag to Abuyog was worse, and after the

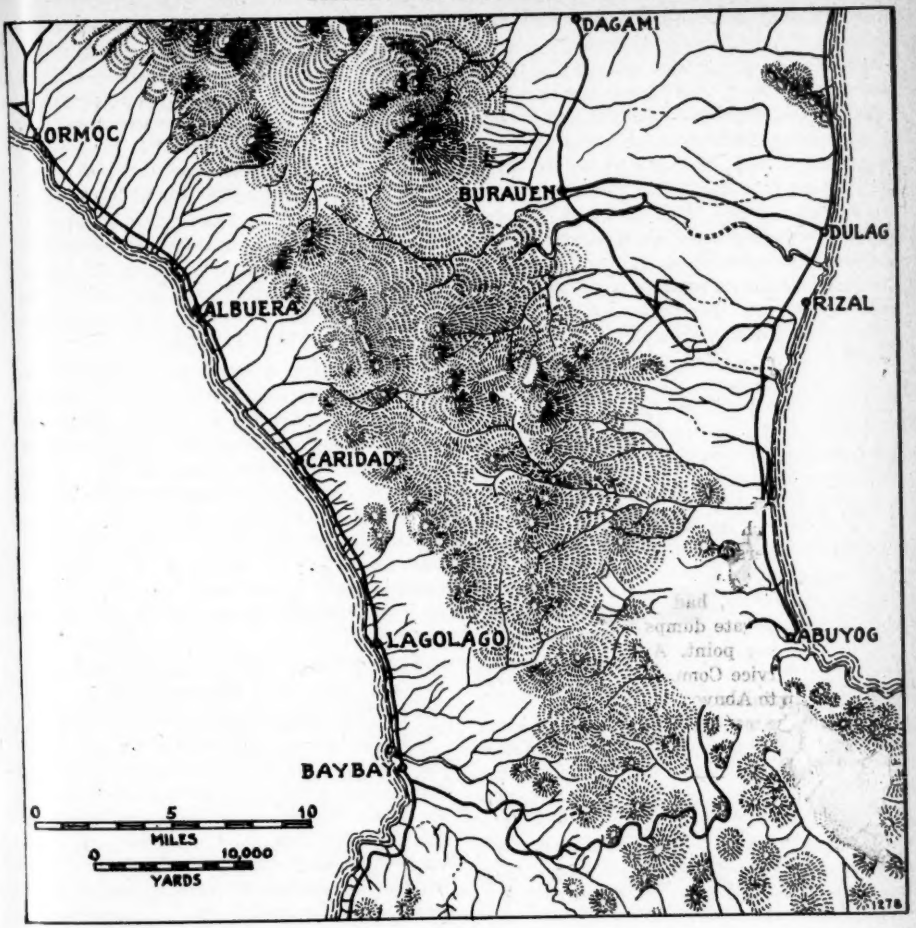

FIGURE 2.

division had moved its combat units over it, the road had to be closed until major repairs could be completed. Torrential rains washed out native bridges and finally the large ponton bridge. Engineers were at their wits' end. There was no gravel here, so sand and corduroy had to be used. All bridges had to be strengthened. More than one engineer soldier was drowned in the swift currents. Finally, all traffic had to go down the beach by DUKW. These were limited in number and were overworked, making a difficult maintenance problem. No trucks could make the trip on the beach due to the depth of water at the mouths of the many streams. Those that had to be used later on the mountain road were dragged through and then dried out. Jeeps traveled on the dry stretches and were ferried across the river-mouths by LVT's. This ferry service proved very valuable during the long period that the corps command post (at Rizal) and the dumps at Abuyog

were isolated from each other and from Dulag.

Division supply points west of Dulag had been left for the 11th Airborne Division. That meant that additional allocations had to be requested by corps from the Service Command dumps at Dulag. But allocations at dumps and having the supplies in the hands of the soldier who needs them are two different things. Corps is not an administrative unit—at least not theoretically. Its headquarters is not large enough to operate ports and supply dumps. Yet this was the solution that had to be adopted in this case. After the 7th Division had arrived at Abuyog the problem of supplying it became acute. When the road was first closed the prospect of other than intermittent use for at least ten days was not favorable. Access roads were built across the swamp by use of corduroy (coconut logs) and sand to connect the beach with stretches of the highway that were passable. But this was hardly a solution for anything more than jeeps and ambulances.

Corps, therefore, had to start a port at Abuyog and operate dumps for all classes of supplies at that point. Arrangements were made with Service Command to send a corps resupply ship to Abuyog and to furnish LCT's to complete the movement of the remainder of the division (by this time only rear echelon and service units and vehicles) from the Dulag beach area. A great deal of ammunition, of which the division was critically short, was also sent by ship. Corps set up a small supervisory staff at Abuyog, allocated some twenty-five DUKW's for lighterage service, and called on the division to furnish 300 men for labor for unloading the ships and stocking the dumps. Replacements which had recently arrived were used for this purpose since they had no weapons. Corps special staff officers supervised the operation of their respective dumps. All this took considerable time to develop, and the division, during its later attack on the west coast, felt that it was operating on a shoestring. However, although the attack was undoubtedly retarded due to shortage of ammunition, the division made excellent progress and gained its objective.

If the difficulties so far encountered seem large to the reader, they were as nothing compared to those still to be overcome by the men on the ground. No mention has yet been made of the mountain road from Abuyog to Baybay. Luckily, the combat elements of the division had little difficulty in making the trip. No enemy opposition was encountered and no effort had been made by the Japs to destroy any of the culverts or bridges or to cause landslides at critical points. One bridge was mined but was not blown.

The fact that the road was still usable did not make the problem simple. It still had to be used as the MSR of the division. Many combat units such as tanks and heavy artillery, as well as all service units, had not yet gone over. As soon as this heavy traffic started pounding across, the road rapidly went to pieces. Before the story of the Herculean task performed by the engineers is told, perhaps it would be best to describe the road in order to indicate the nature of the job facing them.

The road distance from Abuyog to Baybay is twenty-nine miles. The first eight miles are through rice paddies, and it was here that an impassable stretch later developed, necessitating winching through of critical supplies and ambulances until the road was finally closed for a few days while repairs were completed. For the next few miles the road rose gradually into the foothills, which were covered with banana, abaca, and coconut trees. There was gravel here, and except for the reinforcement of bridges over a couple of wide and swift mountain streams the maintenance was not too difficult. One bridge had to be replaced by a ponton and later a Bailey bridge.

From the foothills, the old road, formerly a one-way paved highway but fallen into disuse and neglect during the Jap occupation, wound up into the mountains. At the 3,000-foot level it worked its way through the rain forest into hairpin turns, around vertical banks, and over deep ravines. Many of the old stone culverts held up, but others went

out in short order. A logging camp was put in operation at the top of the pass and large timbers were cut for bridges and culverts from the abundant Philippine mahogany and other hard woods.

The rain fell ceaselessly. Torrents came down the mountainsides, and there could always be seen long rows of engineers, soaked to the skin, working on the drainage ditches. The results accomplished in keeping this road open were little short of miraculous, and the greatest credit is due these officers and men.

not exceed three weeks. It was realized that at the end of this period something radical would have to be done to augment the supplies sent by road.

However, 300 tons per day required 120 2½-ton trucks per day or 240 trucks over the road, including return trip. There were twelve hours of daylight. Night travel was dangerous due both to snipers and to the difficult blackout driving conditions. Snipers were taken care of during daylight by armed guards and armored-car escorts. After para-

Time—Distance Table

From	*To*	*Distance*		*Time Dependent upon Weather*
Burauen	Dulag	10 miles		1½ to 3 hours
Dulag	Abuyog	15 miles	by beach	1½ to 2 hours
			by road	2 to 3 hours
Abuyog	Baybay	29 miles		3 to 5 hours
Baybay	Caridad	11 miles		1½ to 2 hours
Caridad	Ormoc	16 miles		1½ to 2 hours
Total:	Abuyog to Ormoc	56 miles		7 hours
	Dulag to Ormoc	71 miles		9 hours
	Ormoc to Palo	86 miles		10 hours
	(evacuation to General Hospitals)			

As the division advanced north from Baybay, the supply line lengthened. At the close of the period under consideration the total was over seventy miles. To supply a division involved in an attack over such distances was not impossible, provided the roads held up. On the west coast the road situation was not quite as bad as that previously described, since the rains were less frequent and there were few rice paddies to cross. The beach (large cobblestones, not sand) was used most of the distance. This was hard on vehicles and harder on casualties, but the traffic went through. Delays were caused only on occasion by flash floods at the mouths of the many streams that flowed out of the mountains.

FM 101-10 stated that 500 tons per day were necessary to supply the reinforced division. Corps and division agreed that the division could exist on 300 tons per day for the duration of the attack, provided it did

troopers landed in the vicinity, the guards were increased and two companies of Filipino guerrillas were assigned to assist the two companies of engineers charged with both maintenance and protection.

During daylight and with good road conditions, traffic density would thus have been thirty-three trucks per hour each way. However, parts of the road were one-way, and the strictest traffic control measures had to be enforced. Forty-five minutes were required for a convoy of thirty trucks to negotiate the most difficult stretch. Thus a schedule of departures from the control points at each end allowed a convoy to start every hour and a half beginning at 0730 (going west) and continuing until 1715 (last trip going east). This schedule permitted sixty vehicles through every hour and a half, or 420 per day. This included vehicles of all types, and the necessity of evacuation of large numbers of casualties (not serious

cases who would not have survived the trip) reduced the number of supply trucks that could traverse the road. This was not a serious reduction since the division did not have that many trucks available for the purpose. Due to shortage of shipping, units left Oahu with forty percent of organic vehicles and to date there were no supporting quartermaster truck companies to be had. A provisional truck company was organized utilizing 2½-ton vehicles from infantry, artillery, and service units, and maximum tonnage possible was moved in this manner. The majority of tactical vehicles were left with units for their own supply from division supply points.

But 400 vehicles possible across the road was still only theory. Due to maintenance difficulties, due primarily to water but also to lack of available materials at convenient points, the road was closed in spots for sufficient lengths of time so that little more than 300 vehicles were able to make the trip on the best days. The average over a month was less.

To alleviate the situation, trucks were loaded to three tons, although this was hard on both the trucks and the road. The supplies had to get through, however, and this was one of the solutions adopted.

When the division first arrived at Baybay, supply points for all classes were set up on the beach near that town. These dumps were always low. Especially critical were 105-mm ammunition, rations, shoes, and socks. A limit was placed on the allowable daily expenditure of ammunition, troops were placed on half-rations status for periods, and every effort was placed in getting shoes and socks to combat troops. Continuous fighting for a month over difficult terrain with the leather soaked most of the time had made short work of stout GI shoes. The men called it "Valley Forge" since many were without shoes for a short period. Many others had developed a mild "immersion foot" which, although ordinarily not serious, proved in this climate to be fertile breeding ground for tropical fungus. As a result, the majority of men returning to rest area duty (guarding L of C [line of communications] against continuous infiltration) could be seen limping. Nothing was spared, however, in an effort to alleviate this situation, and in a few days it was corrected.

In spite of seemingly insurmountable difficulties, the fight for supplies went on. Later, after the breaking point was about to be reached, the Navy risked a few LSM's and LCT's in the Camotes Sea, a task which they had not formerly attempted due to Jap air, PT-boat, and destroyer activity in that area. This solution had to be adopted although it was not without its losses in ships, men, and supplies. Another factor forced the augmentation of supply by ship. By this time the 77th Division was landed at Ormoc behind the Jap lines (the 7th Division was at Albuera driving north) and if difficulty had been experienced supplying one division by road, two divisions and some corps troops would have placed an absolutely impossible strain on the L of C facilities. From then on, with a combination of ship and truck transport the situation began to ease—but it was those early, hectic days, when everyone hoped and prayed that the "shoestring" would not break, or that the Jap resistance would not require unduly heavy expenditures of artillery ammunition, or that paratroopers would not land as they had on the east coast, or that no barge landings would be made in the division rear area, that caused many worried days and sleepless nights for commanders and staff officers. However, the impossible had been accomplished and with the usual American luck this phase of the operation was completely successful.

Another solution adopted was para-drop. Facilities were limited, and this was only used in extreme emergencies. One of these critical periods arose when there was less than a day's supply of gasoline in the hands of troops on the west coast and the road was out. Four C-47 planes each dropped ten 55-gallon drums on the beach at Baybay—twenty-two hundred gallons worth their weight in gold. The operation was perfectly executed and was a beautiful sight. Cover was given by P-38's overhead.

If supplies had a hard time getting over

the L of C [line of communications] just described, casualties had a tougher time getting back. The ride from Caridad to Baybay over the cobblestones was bad enough for a healthy individual. Wounded men took a terrible beating. The long drag over the mountain did not add to the chance of eventual recovery of seriously wounded. These, therefore, had to be left on the west coast in clearing stations until they were well enough to be moved or until water transportation could be provided. This, of course, resulted in crowding of these installations beyond capacity and in working the doctors and medical men to the limit of human endurance. As soon as possible a field hospital was moved to the west coast at a point on the highway four miles east of Baybay. Serious cases then obtained additional treatment, and expanded facilities were available for their care, since they still could not be moved. The presence of these serious cases required drastic measures in order to make room for the rapidly increasing numbers. Many slightly wounded patients had to be billeted in a school building with a space on the floor and a blanket as their only comfort. They were dry, however, which in this country was a blessing in itself. Additional mess facilities were diverted for their use from service units in the vicinity. Ambulances of division and corps units and corps collecting companies were pooled for convoys to Dulag (and Palo for general hospital cases), and as many as 300 patients per day were evacuated during the worst phase of the operation. Luckily, just at the time the hospital had reached its absolute limit, water evacuation was provided and the situation rapidly cleared.

A story such as this would not be complete without a mention of the signal communications difficulties overcome. Field wire is not supposed to operate efficiently over fifteen miles. With a line of communication of seventy miles—what to do! Relay stations were installed at Abuyog and Baybay by the corps signal battalion for relay of telephone and teletype messages. Two wire lines were laid over the mountain road and each pair used as one side of a circuit. This reduced the resistance and permitted satisfactory voice and teletype service over the thirty miles. Ground return was used when one side of the line went out. Repeaters were used to the maximum. This necessity for relay spread the available communications personnel rather thin and imposed on all an additional burden. In spite of bombings at Baybay, infiltrators who blew up or cut out sections of the line, rain which grounded out circuits frequently, dozer operators who knocked down palm trees loaded with wire lines, snipers who made their work dangerous and difficult, and despite all the difficulties imposed by weather and terrain, these men realized that their lot was still easier than that of the front-line soldiers and did their job efficiently, willingly, and continuously.

The high mountain range interfered with the certainty of radio communication, but operators repeated until they were understood.

Motor messengers took from six to eight hours between corps and division. Therefore, a division liaison plane strip was prepared at Lagolago and motor messenger service installed between the strip and division (at Caridad) and corps advance command post (at Baybay). Two trips a day were made by plane between corps command post at Rizal and the division strip. Later a drop and pickup service was started at Baybay to speed delivery of important light-weight documents.

All of these means were used to full advantage, messages sometimes being sent by as many as three different means to insure delivery. In this connection, it was found advisable to place "confirmation copy" on messages sent by the slowest means when reception by rapid means was uncertain. Staff officers receiving a message several hours old by Cub plane did not appreciate the delay, not realizing that the proper party had already received the information by other means.

But the messages got through. Interruptions were frequent but not of sufficient duration to impair seriously anything but the

digestion and temperament of the signal officer.

As time went on, other improvisations and additions were used to increase the efficiency of the supply, evacuation, and communications systems. One example was the use of several captured Jap barges between Baybay and points north. A frantic plea for American flags and red, white, and blue paint from the engineers manning the barges was somehow met. United States gunners on the west coast were a bit touchy on the subject of Jap barges, and unmistakable identification was necessary.

For the successful solution of this logistical problem and its resulting support of the combat operation, the highest credit is due those unsung heroes whose names seldom appear in print. The valiant and overworked surgeons, the medical men and ambulance drivers, the truck drivers, the engineers who worked ceaselessly under the worst possible conditions, the linemen, the supply-point operators—all contributed their share. Their reward is only the satisfaction that comes from the knowledge that the job was well done.

Once again it was American ingenuity, resourcefulness, and guts pitted against a relentless climate and terrain as well as an enemy who would not surrender. Once again it was the leadership of the officers, the teamwork of all ranks, and the dogged determination of the "GI Joes," combined to produce the impossible. These are the "imponderables," the factors that cannot be measured or given weight in a theoretical problem, and can only be estimated in operational planning.

"The difficult we do at once; the impossible takes a little longer." Only leadership can produce such results.

Skin Diseases in the Tropics

Digested at the Command and General Staff School from an article in *The Bulletin of the U. S. Army Medical Department*, September 1944.

THE Office of the Chief Surgeon, Southwest Pacific Area, has reported that skin diseases are an important factor in non-effective rates in the forward areas and that about seven percent of hospital admissions and four percent of patients evacuated to the United States are due to such diseases. Many dispensaries are said to show as high as seventy-five percent of those reporting to sick call suffering from skin diseases which, in general, are the same as those seen in temperate climates, but because of climatic conditions they take on different characteristics and frequently are more severe. Yaws and tinea imbricata have not been observed.

Until recently, qualified dermatologists were not stationed in the forward area, but this situation has been improved. It has been noted that the successful treatment of skin diseases in the tropics differs from that in temperate climates. The most common mistake, the report states, has been overtreatment. The drugs most often misused have been salicylic acid, iodine, and the sulfonamides. Ointments, pastes, and occlusives have to be used with extreme care because they are likely to produce maceration. Self-treatment with the fungicidal solution (Frazier's Solution) supplied in the jungle kit has been responsible for much overtreatment.

The most common dermatoses observed are fungous diseases. Dermatophytoses of the feet and hands show a greater tendency to become eczematized than in temperate climates, especially when overtreated.

Eczema of hands and feet, infectious eczematoid dermatitis, atopic dermatitis, and other eczematoid conditions are apparently always aggravated by the tropical conditions and more care should be exercised in overseas physical examination to prevent individuals with these conditions being sent to the tropics.

Collapse in Tunisia

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The author commanded the 1st Battalion of the Rifle Brigade, which is a battalion of the British armored infantry, during the advance of the 8th Army from El Alamein to the capture of Tunis. —THE EDITOR.

WE live in days when victories are common. Any officer, American or British, with combat experience will recall days and battles that went well, and which culminated, often after hard and bitter fighting, in a substantial victory.

Soon the days of ordinary military success will be over, and shortly those of us who are lucky enough to have an appointment in a theater of war will witness the rare and refreshing sight of the German military machine in complete breakdown and surrender. Once seen, it is a sight which is never forgotten.

There have been many occasions where, under pressure of British and American forces, a great victory has been won, but the final battle in Tunisia in May 1943 is one of the few battles which have resulted in a total eclipse of all the German forces in the neighborhood. Both Japanese and Italian forces have in certain cases met a similar fate, but the Germans have generally managed to maintain intact a certain proportion of their forces, however badly the battle may have gone for them. In view of the terrible thrashing which is coming to the Germans in the course of the next few months, it may be of interest to examine what occurred on that previous occasion in Tunisia to which I have referred.

My story opens during the last week in April 1943, when the 7th Armored Division (British) to which I belonged had arrived in southern Tunisia from the western desert of Libya and Tripolitania. It was a hard and seasoned division containing men who had seen the ebb and flow of desert war since May 1940. Many units had done eighteen months or more in daily contact and were up to every trick that the enemy could play and a few more besides. In addition to being a seasoned division they were an exceptionally happy crowd, and all the units, whether fighting, service, or staff, were on the best of terms with each other and full of confidence about bringing the matter to an early conclusion.

On 25 April the Eighth Army, under Sir Bernard Montgomery, was disposed as shown in the accompanying map. It will be seen that the divisions in contact were disposed from east to west in the order 1st New Zealand Division, 4th Indian Division, and 7th Armored Division. Contact with the Free French Corps on our west flank was kept through the medium of the 4th Armored Brigade, an independent brigade largely on an armored-car basis.

For some days the army had made little headway against the high ground to the north of Takrouna, though the New Zealanders and Indians with great gallantry had begun to establish a foothold in these hills.

On 26 April I went to a divisional conference where General Erskine, our Divisional Commander, explained a project for breaking through in depth in the coastal plain area. The plain north of Enfidaville is about 3,000 yards wide. It was overlooked from the west flank by high ground held by the enemy and was full of mines, wire, 88-mm guns, and other devices designed to ensnare the unwary soldier. It must be confessed that many officers who attended that conference viewed with alarm any attempt to break through in that sector. We were all old enough soldiers to realize that that plan implied an extremely sticky operation.

On 27 April we heard with relief that other plans were in the air, and that night the 56th Division was moved up, having made an approach march of over 2,000 miles from Iraq, and took over the fronts of the 4th Indian and 7th Armored Divisions.

The plan of Sir Harold Alexander, commanding the 18th Army Group in Tunisia, was to switch these two divisions to the northern

front where they were to join the British First Army and U. S. II Corps. The move to the northwest as shown on the accompanying map was carried out in two nights over mountain roads and went with remarkable smoothness. Total Allied air superiority enabled it to be carried out in secrecy and without hostile intervention. In fact, it can be said that without air superiority the plan would have miscarried.

Both divisions were then concentrated in the Testour area. On 3 May the plan was unfolded to all commanding officers at division headquarters. Broadly speaking, it envisaged an advance astride the main road Medjez-el-Bab—Massicault—Tunis. The start line was to be a line drawn north and south through Grich-el-Oued, and the divisions were drawn out as follows: south of the main road the 4th British Division supported by the 6th Armored Division; north of the main road the 4th Indian Division supported by the 7th Armored Division. The infantry was to attack at 0300 hours on 6 May, and it was hoped that it would reach its objectives by 0900 hours that morning. On the first sign of the opposition weakening, the armored divisions were to go through and consolidate objectives: (i) Massicault-Tebourba, (ii) St. Cyprien-Djedeida, (iii) Tunis Town. The official appreciation was that it would be a stiff job and that fighting might last for a week. Seldom has a general staff appreciation been wider of the mark. On 3 May I went up and saw Colonel Andrew Scott, commanding a battalion of Irish guards east of Medjez-el-Bab, and was able to look through glasses at some of the ground over which we had to fight. It was rolling and cultivated but open and dry, and I got the impression that it was good armored country.

At 0300 hours the attack went in, supported by armor specially detailed for the close support of the infantry. In addition, an extra special barrage was arranged to support the attack. The attack was remarkably successful, and by 0900 hours the armor was streaming through. Thanks to the Indians, we got a clean break. We had expected to fight our way forward through mines and prepared defenses, but luckily there were few of the former and the Gurkhas had seen to the latter. By 1400 hours we had secured the Massicault line and had got about 1,000 prisoners. We formed a firm base on this line and prepared to go forward the next morning. We were all in good spirits and realized that the show had gone well.

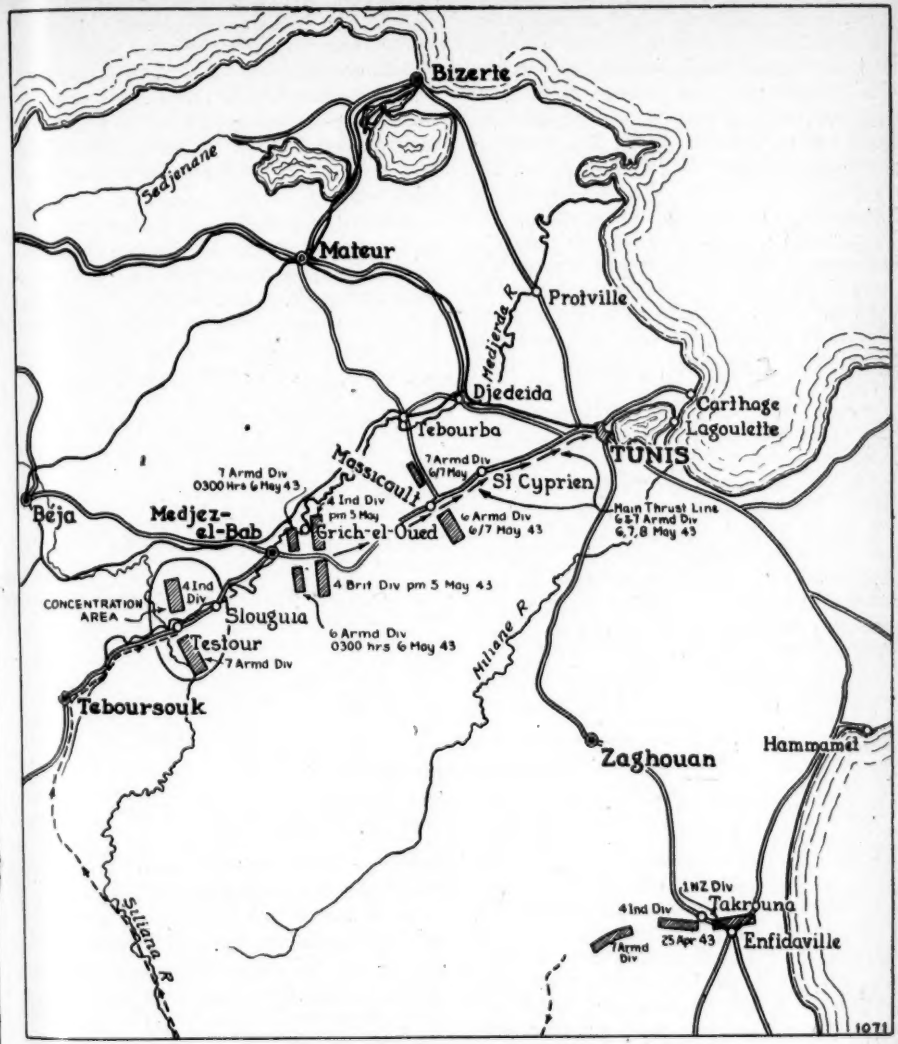
Few of us had dared to hope that we were within forty-eight hours of complete German collapse.

The next day, 7 May, was the most amazing day I have ever seen in my service. By midday we were in St. Cyprien, having had a successful morning's fighting and picked up some more prisoners. By 1600 hours a drizzle came on and we came over the last hill between us and the sea to see Tunis lying below us. I think even the most hard-boiled of us felt a thrill to see that great city lying at the bottom of a long, grassy slope.

The whole division was flying forward as fast as it could lay legs to the ground. My battalion was operating with our old friends the XIth Hussars (armored cars), who were the divisional reconnaissance unit, and individual drivers were beating each other to reach the town.

The enemy was taken completely by surprise. The XIth Hussars beat us to the town hall. The city presented an amazing sight. Most of the shops and business houses were closing and the streets were full of civilian traffic. Astonished Germans were seen on the pavements, walking out and with their girl friends. Some resisted—others surrendered straight away. The populace was screaming itself hoarse in true French style. There was a lot of confused firing and fighting in the streets. To the enormous amusement of the battalion, I was embraced from behind by a highly colored French female of ample proportions and acquiescent tendencies while trying to speak on the radio to one of my companies which had been isolated in the dock area.

By 1800 hours prisoners were pouring in and the Corps Provost Staff had with great promptness improvised a cage in the suburbs.



1- The positions of the BRITISH, NEW ZEALAND, and INDIAN Divisions are shown with dates.

2- The approach march route of 7 Armd Div is shown thus-►-. A small portion of this route is below the south boundary of the map.

3- The final thrust line is shown thus ►-►-►.

We spent a confused night street-fighting and rounding up prisoners. By 0300 hours the town was quiet. The next day beat all records. The division was ordered to swing to the north and get in touch with the American 1st Armored Division which was having a great time north of the Medjerda River. The scenes were incredible. Whole parks of vehicles and guns were taken intact. My "A" Company took a complete German regiment, and every corporal was driving around in a German staff car. "B" Company captured the Governor of Tunis, complete with girl friend and Buick Saloon. "C" had 5,000 prisoners by midday. Thousands of prisoners drove themselves and their vehicles into the cage without escort. The war machine had collapsed with a vengeance. Everything had gone in a night—control, morale, equipment, leadership, discipline; everything that makes an army a cohesive unit. In the face of such a breakdown, German discipline and tradition were powerless to do anything. On 9 May resistance in our area was at an end. The battalion was moved to camp at Carthage and the men were able to take advantage of such amenities as Tunis presented.

In this connection it should be recorded that the behavior of the troops—American, Indian, and British—in the town which afforded many opportunities for misbehavior was exemplary, and I was not the only commanding officer who had no cases of drunkenness or absence without leave. The men's bearing and turn-out in the town, after months and years of fighting, was an example to later arrivals.

And so I come to the end of a very bare and brief record of a very long journey. There are many military lessons which may be learned from the operation, but the big one which has burnt itself into my mind is that when Germany does collapse she will collapse overnight like a pack of cards and that no single person, military or political, can say when that collapse will come. One can only say that when it does come it will be complete, and first-class fighting troops will change as if by magic in a single night into a frightened crowd of sheep-like individuals.

The American 1st Armored Division, the 7th Armored Division, and the 4th Indian Division are still fighting with all their old skill in their respective theaters, and we can be certain that when the final collapse comes they will be there to see the fun again. Good luck to them.

Artificial Moonlight

Digested at the Command and General Staff School from an article in *The Sphere* (Great Britain) 11 November 1944.

THE area stretching southeast from Nijmegen to Venlo in Holland (where the Allies advanced towards Venraij) is very difficult country for the attackers, consisting as it does largely of marsh and woodland. The movements against the Germans were carried out mainly at night. To make such operations possible, use was made of searchlights to create "artificial moonlight" by projecting the powerful antiaircraft beams up to the clouds. By this means the troops on the ground secured enough vision to progress across the marshy, flooded country.

In Italy, too, similar use has been made of "artificial moonlight" by the Allies. During the advance to Forli, and towards Bologna, it was necessary to cross the Savio River. Swollen with the heavy rains, this was no easy feat; and again the searchlights were brought into play to light up the night sky, as at other points on the Eighth Army front.

The enemy I knew almost like my own side, and I often risked my life in going among them to gain this knowledge.

—Lawrence of Arabia, about 1920

Antiaircraft Artillery with Armies, Corps, and Divisions

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IN this period of so-called "modern" warfare all operations have proved that the nine basic principles of war remain unchanged; intelligent application of these principles is the only means of waging successful warfare. However, the art of applying these principles to take full advantage of the recent tremendous development of weapons and equipment is a subject which requires continual study. Once a supporting arm has the proper equipment with which to perform its mission, the keynote to successful use of that arm is a system of command, control, and coordination of effort which will best incorporate it into the combined effort.

Throughout the present war the development of such a system has been evolving through experience. Early maneuvers in this country illustrated forcibly that much improvement was necessary in control of attached antiaircraft artillery. Antiaircraft officers at division and corps headquarters were ignored; field orders in many cases failed to include instructions to antiaircraft artillery units. The inevitable result was that these units played no effective part in the combined effort. Had there been any real air threat, air attacks would have caused great damage to vital troops and installations. In North Africa one higher headquarters failed to notify attached antiaircraft artillery of an impending withdrawal; the inevitable result was that complete units were either destroyed or captured. In planning for an amphibious operation a division staff did not include antiaircraft officers as a part of the planning staff. When the landing was executed there was no plan either for landing antiaircraft artillery or for effective control of these units during the critical phase of the operation. The results were inevitable; no one could tell antiaircraft units when or where to land. Units were landed on the wrong beaches too late to be of use and became lost, and vital elements of the landing force were left without antiaircraft protection during the critical period of the operation. More recently, increased experience has resulted in avoidance of most such misuse. In Normandy the vital elements of the landing forces had antiaircraft protection when and where they needed it most, and the air threat to the operation as a whole was negligible.

But it is never safe to let well enough alone. Commanders and staff officers of divisions, corps, and armies must strive continually to develop proper systems of control so as to obtain more effective use of the forces at their disposal. The basic principles governing control and coordination of antiaircraft artillery with these larger units must be thoroughly understood before they can hope to gain the greatest benefit from this supporting arm.

The most important principle underlying use of antiaircraft artillery is *flexibility*. This is substantiated by the fact that all such units are organized as *separate* battalions, groups, brigades, and commands. Assignment of missions to various units and attachments of antiaircraft artillery must be changed continually to insure massing of available means around the most vital objectives when and where they exist. Control and coordination, to be effective, must embody this principle.

THE FIELD ARMY

The headquarters of an army contains organically an antiaircraft section, headed by a brigadier general. It is this officer's job to advise the commander on all matters of antiaircraft defense of troops and installations of the force, and acting for the commander himself to prepare detailed plans for accomplishing this defense most effectively. Within limits laid down by the army commander, the antiaircraft officer controls and coordinates

the overall establishment and maintenance of defenses against enemy air action.

The enemy is limited in his choice of objectives only by his ability to pick out the target on the ground. Hence, almost any troop unit or installation in the army area becomes liable to attack from the air; cover, concealment, and camouflage of themselves will seldom guarantee safety from destruction or damage. It is therefore obvious that, considering the tremendous number of objectives which offer themselves in an army area, no reasonable amount of antiaircraft artillery can protect more than a small fraction of troops and installations at one time. Furthermore, antiaircraft artillery must be concentrated to provide effective defense—scattering it thinly over a wide area is hardly better than no defense at all. Therefore, to insure that antiaircraft artillery is used to the utmost advantage, it is necessary that the army commander reach a *command decision* as to *priorities* for defense. This list of priorities is the directive to the antiaircraft officer which forms the basis for all his plans for dispositions of units and allocations to subordinate commands. It must be kept continually up to date; the most vital objective today will not be the same tomorrow.

The amount of antiaircraft artillery attached to the army will vary according to the army's needs in a changing situation and according to the amount made available by higher command. The amount initially assigned to an army represents both what is available for defense of army objectives and what must be further allocated to corps and other subordinate units. Normally, each division in combat will require a minimum of one automatic weapons battalion, either mobile or self-propelled. In addition, each corps will usually need a group of two or more battalions over and above what is provided for divisions under its control. Army in its turn will require anywhere from a group of three or more battalions to a brigade of two or more such groups, depending on the number of vital objectives which require defense. Proper coordination and control of this antiaircraft artillery is an art—particularly so because the system devised must permit flexibility in attachments and detachments to meet changing defense requirements.

The first problem of control to be solved at the army level is designation of the actual commander of antiaircraft artillery units under army control. The army commander may do either of two things:

1. Retain attached units directly under his own command, using his antiaircraft officer as a staff officer only and having him accomplish necessary control and coordination of attached units by issuing orders and directives to such units in the name of the army commander.

2. Make his antiaircraft officer the actual commander of all attached units. This may involve the ticklish question of placing an attached brigade commander under the command of an officer junior in rank. Neither system of command can be said to be better than the other in all cases. If the army antiaircraft officer is a capable commander himself, it may be advisable to place all attached units under his command. This method makes it much simpler to obtain the control necessary to obtain effective defense of the army installations and to insure coordination of defenses with adjacent and lower units. However, whatever system of command is used, all antiaircraft artillery under army control should be placed under either the army antiaircraft officer or the senior unit commander of attached units. A single command is essential.

This antiaircraft artillery commander will accomplish coordination of effort and insure proper use of attached units by:

1. Issuing orders governing missions to his subordinate units and readjustments of dispositions to maintain continuous defense of the most vital objectives.

2. Issuing to his subordinate units the standing instructions for control of fire action as laid down by the commander responsible for the air defense of the area.

3. Publishing technical training directives and memoranda necessary to keep troops abreast of new developments.

4. Maintaining liaison with antiaircraft artillery commanders of defense or adjacent areas to insure coordination of dispositions and fields of fire along the front, flanks, and rear of the army area and to insure coordination of warning systems.

5. Allocating and shifting of supplies (particularly ammunition) among subordinate units as determined by their individual requirements.

In his staff capacity the army antiaircraft officer must continually advise his commander and prepare plans for proper use of the army antiaircraft artillery. The commander may want recommendations on changes in the priorities for defenses to meet changes in the nature and location of installations vital to the success of his mission. The antiaircraft officer must foresee, plan for, and recommend changes in the amount and type of antiaircraft artillery allocated to corps or separate divisions based on their changing needs.

The question of centralized control versus allocation by attachment to subordinate units is one which needs careful consideration. If the commander of antiaircraft artillery units providing defense for other forces can exert effective control over such units, then there is much to be gained by retaining these units under his central control. Full coordination of defenses of individual objectives is essential to effective defense of an area, and liaison can never effect such coordination as well as command. Attachment of antiaircraft artillery to a supported force also operates to cut down flexibility in employment, particularly if changes in mission or dispositions must be made on short notice. There are, however, certain conditions under which centralized control by a higher antiaircraft artillery commander sometimes becomes impracticable or ineffective. These are: wide separation between objectives, rapidity of movement of a supported force, lack of effective signal communications, or a vague situation in which developments cannot be foreseen in advance. In such cases attachment of antiaircraft artillery to the supported force may be the only answer if such support is to be effective. From the army standpoint it is normal to attach to subordinate corps sufficient antiaircraft artillery to provide protection for its vital elements. The corps commander has the prerogative of determining what elements within his command he considers vital to success; and only he can tell with any degree of accuracy what elements will need protection, when such protection is necessary, and where vital objectives will occur. In fully stabilized situations, where no change in dispositions is imminent, even antiaircraft artillery in support of corps may be collected under army control for greater efficiency of employment. But in any kind of changing situation it will normally be necessary to release control of available means to corps, except that which is to be used in defending army objectives.

There is one expedient which may be resorted to in order to obtain increased effectiveness in protecting subordinate commands without loss of flexibility. Antiaircraft artillery units retained under central control may be given a mission of *support* of the protected unit, just as field artillery is placed in support of infantry. This mission allows the supported commander to make full use of the units who are to furnish him protection, and at the same time insures by direct chain of command that the higher antiaircraft artillery commander can exert immediate and effective control should that become necessary. It should be borne in mind that there is no distinction made between "direct" and "general" support as is done with field artillery.

Another element of control peculiar to employment of antiaircraft artillery should be clearly understood. A force commander has full control over assignment of missions to attached antiaircraft artillery and over tactical dispositions of such units to fulfil these missions. But authority for controlling and restricting actual firing of weapons rests with the fighter controller responsible for the air defense of the area. This control of fire will be exercised normally by standing operating procedures or special measures issued direct to the antiaircraft artillery command-

er through the local fighter controller. A supported commander must not change these instructions within his unit; they represent a restriction imposed by a common superior to obtain coordination of effort.

The Corps

The corps has no organic antiaircraft section in its headquarters; hence the corps commander will have to designate the senior attached unit commander as antiaircraft officer on the corps staff and as corps antiaircraft artillery commander. Normally this will be the commander of the group or brigade allotted from army. If two or more battalions are involved, a group headquarters should be provided from army to perform the staff and command functions involved in control and employment of the corps antiaircraft artillery. Similarly, if two or more groups should become necessary, a brigade headquarters should be provided. It is bad practice to require a battalion commander to control and direct another battalion as well as his own. His command and special staff responsibilities are then such that he cannot give proper attention to each one. If such higher command element is not provided, however, the senior battalion or group commander should be designated as commander of all attached units.

The corps antiaircraft artillery commander has duties exactly similar to his counterpart at the army level. He must be provided with a list of priorities for defense which is kept up to date with changes in the location and nature of objectives which the corps commander feels are vital to success. He then determines how much of the available means are required to provide adequate defense for each objective in order of priority. Based on these decisions of his own he distributes the available means by issuing detailed missions to subordinate units. He supervises the setting up and maintenance of defenses, and makes such changes as are necessary to obtain maximum mutual support and coordination of fields of fire. He establishes and maintains close liaison with unit commanders to his front, flanks, and rear in order to insure full mutual fire support and coordination of warning systems. Since it is normal to provide divisions with defense by attachment, he recommends to his commander proper attachments after considering the needs of the divisions versus availability of means from the corps point of view. He formulates and conducts such training programs for his subordinate units as may be required to maintain a high state of combat efficiency. He controls the amount and types of supply, particularly ammunition, to be allocated to units, including those under division control, and makes any readjustments between units as may be necessary. He issues necessary orders to accomplish rotation of units which have been in forward areas subject to enemy ground attack or artillery fire for extended periods.

Antiaircraft artillery under the corps can often be used forward of division rear boundaries to provide protection for certain more static elements of divisions. For example, supply points and defiles on lines of communication of divisions normally are not subject to frequent changes in location. The corps antiaircraft artillery commander should guarantee protection of such objectives, and retain under his own control the units necessary to provide their defense. This procedure permits greater flexibility in the use of available means to meet changing requirements by making it unnecessary to release control of the bulk of antiaircraft artillery to divisions. In Italy, corps habitually used this system of protecting rearward installations of its divisions in contact, including any large troop or motor movements. This permitted antiaircraft artillery attached to divisions to protect the division artillery as a continuing mission.

Operational control of firing will be dictated to the corps antiaircraft artillery commander through either of two channels: (1) from the army antiaircraft artillery commander direct if all antiaircraft artillery in the army area is under the operational control of a fighter controller, or (2) from the fighter controller direct if corps antiaircraft

artillery is directly under him for operational control.

The Division

Control of antiaircraft artillery attached to a division normally presents no problem different from that at the corps level. The duties and responsibilities of the antiaircraft artillery commander, and his methods of exerting control over his units, are very similar within his more restricted sphere of action. Normally the minimum attachment to a division will be an automatic weapons battalion (including calibers up to the Bofors 40-mm gun), either mobile or self-propelled. Under special conditions this may be increased to two battalions or more. In this case a group headquarters should be provided for control if possible. If two or more battalions are not placed under group control, the division commander should designate one of the battalion commanders as antiaircraft artillery commander and place the other battalion under his command. The one so designated will normally be the commander of the battalion which habitually operates with the division.

Defense of vital elements of the division can usually be accomplished under centralized control. In an infantry division the only situations which normally require attachments to subordinate units are marching in the presence of the enemy or dispatching a unit on an independent mission which involves wide separation from the remainder of the division. However, operations of an armored division involving great mobility and independent action of subordinate elements may often require attachment of supporting antiaircraft artillery because of ineffectiveness of central control.

The most common mission for antiaircraft artillery with an infantry division is protection of the division artillery. In cases when this is the only mission assigned to a particular unit over extended periods, many division commanders have attached elements of an automatic weapons battalion to field artillery battalions with very good results. This, however, detracts from flexibility of employment, and should not be done if any quick changes in mission are probable. Except in highly mobile operations such as pursuit, the infantry division operates over a restricted area at a pace which makes central control entirely feasible. Hence, attachment of antiaircraft artillery to subordinate elements of the division should be the exception rather than the rule.

One departure from the normal chain of command for antiaircraft artillery with a division or corps has worked very well in actual practice and should be pointed out. Instead of setting up a separate command directly under the commander of the supported force, antiaircraft artillery units are in turn placed under the division or corps field artillery commander for tactical control. This method has the advantage of placing relative strangers under the guidance of a permanent echelon of command which is thoroughly integrated into the larger unit. However, if this procedure is to work successfully, the field artillery commander must do either of two things: (1) become thoroughly familiar with the principles of employment of antiaircraft artillery and with its characteristics, capabilities, and limitations in order to insure intelligent use of such units under his control; or (2) allow the antiaircraft artillery commander under him a free hand in planning for and directing the antiaircraft defense of the supported force, intervening only to insure coordination of effort and to see that antiaircraft artillery receives due consideration in plans for operation of the supported force. Unless properly used, this method may produce a topheavy and cumbersome means of commanding attached antiaircraft artillery. But the British use this system very well; both field and antiaircraft artillery in their infantry division are permanently under the "artillery commander." If the field artillery commander is qualified to command this special arm, the method can be an alternate solution to the problem of obtaining full and effective support of antiaircraft artillery. When it is to be used in a field artillery role, the units involved should be fully relieved of their normal mission,

assigned a primary mission of field artillery, and attached to the proper field artillery commander for operational control as long as this mission remains in effect.

There is no single complete solution to the problem of control and coordination of attached antiaircraft artillery which can be applied to all larger units. Furthermore, a system which works well in the field now may not be the best one a year from now. All commanders and staff officers of higher units should strive continually to make improvements, both to make full use of existing principles of employment of antiaircraft artillery and to take advantage of new methods and techniques which are developed in combat. A great deal of this improvement can be accomplished by making use of the special professional qualifications of antiaircraft artillery officers. But some of such advances can be made only from the standpoint of the higher commander himself or his staff officer. The success of the force as a whole in combat will depend to a large extent on how effective a system of control and coordination of special troops the commander has developed.

Traffic Control and Route Marking

From a report dated 14 July 1944 on an American armored division in Italy.

"ALTHOUGH the — Armored Division has experienced little difficulty . . . in traffic control and route marking, it is felt that there is still room for improvement, particularly with regard to the following:

a. More and larger route marking signs. There is no such thing as too many. Routes should be marked in the same manner as highways are marked at home.

b. Arm, hand, and light signals, particularly the latter. All armored personnel should be thoroughly trained in these signals when they are in replacement centers. Further, the use of conventional flashlight signals is only satisfactory at its best. All traffic-control personnel should be provided with a small multi-lense light. The following code could then be followed by the most inexperienced personnel: Red —Stop; Green—Go; Blue—Turn Right; Yellow—Turn Left.

c. Lights to mark bridges, bypasses, and obstacles. Such lights are normally necessary but seldom available.

Armored Field Artillery

"The following route-marking procedure has been adopted as standard in this battalion. It has proved very successful in the African and Italian campaigns, particularly in a fast-moving situation as the past Rome offensive.

"The battalion reconnaissance officer, being charged with marking the route from position to position, invariably finds that he lacks enough cyclists or markers on foot to guide the unit to its next position, especially when the tactical situation is moving fast and when displacements of ten miles two or three times per day are not exceptional. It has likewise proved advantageous when the battalion advances by infiltration, or makes long marches not under any division or combat-command control. The method used is this: The unit will habitually follow the road —unless marked by a guide. Road conditions being equal at a 'Y' junction, the unit will normally take the right-hand fork of the 'Y' —unless marked. Upon arrival at a four-cornered crossroad, the unit habitually continues straight ahead—unless marked. In event of any extraordinary intersection, a main traffic crossroads, or any place where doubt may arise in the mind of a car commander or driver, a guide is dropped.

"The advantages of this method are that it follows a man's natural instinct, is simple to operate, simple to understand, and relieves much indecision so that the whole unit will arrive with dispatch at the proper destination."

MILITARY NOTES AROUND THE WORLD

GREAT BRITAIN

Tropic-Proofing:

The problem of packing supplies and waterproofing equipment for the Far East has inspired a great deal of British and American ingenuity, as was shown at a recent exhibition at the Royal Ordnance Depot at Feltham, Middlesex, sponsored by the Anglo-American Packaging Committee of the Ministry of Production. Among the exhibits was a complete airplane preserved down to the smallest replacement parts in a corrosion-resisting film. A thick coating of ethyl cellulose on small parts of equipment can be peeled off at the end of the journey. For a great many packages, moisture and vapor-proof envelopes are used. Aero engines are sealed in a transparent bag which contains small packets of "silica gel" that absorb the moisture inside. Some of the transparent bags have a moisture indicator that can be seen through the covering.

(From a British source)

Mosquito with Six-Pounder:

Britain's speedy twin-engined plywood Mosquitoes have been secretly armed with six-pound cannon for attacks on German U-boats and enemy shipping. The formidable weapon, adapted similarly to 75-mm guns used on American B-25 Mitchells in the Mediterranean and the Pacific, is slung beneath the Mosquito fuselage. The cannon was first used in November 1943. According to RAF Coastal Command, after the first two attacks with this weapon the German Admiralty was forced to provide an escort of surface ships and fighters to protect their U-boats on leaving and going into harbor.

(From a news report)

Supermarine Seafire III:

The Seafire III is a single-motor airplane designed as a naval fighter. Basically, it is a development of the famous Spitfire series. A Rolls-Royce Merlin 55 motor, developing

1,470 horsepower, powers the machine through a Rotol four-blade constant-speed propeller. The armament consists of two 20-mm cannon and four .303 Browning machine guns. The Seafire III incorporates certain important modifications for operation from aircraft carriers. Its wings had to be redesigned to fold as shown in the picture.

(*The Illustrated London News*)

Antiaircraft Tanks:

It has been revealed that British antiaircraft tanks are now operating in Europe.

Their main purpose is to protect convoys on the move against attack by low-flying German aircraft. They are tracked in order to enable them to operate over rough country. The first picture shows a tank with twin

Oerlikon antiaircraft guns mounted on a Crusader chassis. The second picture shows a similar chassis converted into a tank with a 40-mm Bofors antiaircraft gun.

(*The Sphere*, Great Britain)

Making Sea-Water Drinkable:

Countless lives of castaways adrift at sea have been lost through agonizing thirst driving them to drink sea-water, and this widely recognized danger has led to the perfecting of several types of apparatus for distilling pure water from the water of the sea. Satisfactory as these are, however, they are mostly too bulky to permit of being carried in aircraft. To solve this problem, the Admiralty asked the Permutit Company, Ltd., to begin urgent research for a compact and simple equipment to convert sea-water into drinking-water without the use of heat. In collaboration with the Royal Air Force Physiological Laboratory and the Ministry of Aircraft Production, the Permutit Company has now developed such an apparatus.

A quantity of sea-water is placed in a flexible bag, and small cubes of a special chemical are added. This chemical, shaken with the water for some minutes, removes the salts and impurities, turning them into an insoluble mud. The flexible bag is then squeezed, and the pure drinking-water comes out through a filter fitted into the bag itself. The equipment is packed into a square box of clear plastic, through which the operating instructions can be read. The flexible purifier bag is packed into the lid of the box, which itself contains a rubber storage bag with nine of the chemical charges. Each item of the equipment is provided with safety cords for attaching to a rubber dinghy to prevent loss in rough sea or during handling. Each operation, using one charge, will provide half a pint of fresh drinking-water. The apparatus has been accepted for use with the Royal Air Force and the Fleet Air Arm.

(*The Illustrated London News*)

INDIA

Boomerang Pigeons:

Descendants of some of the homing pigeons used to maintain communications during the battle of Britain are helping the 14th Army patrols to defeat the Japs in Burma. Men of the Indian Signal Corps, taught by British troops, who were racing-pigeon enthusiasts in civil life, are adapting the homing instincts of these pigeons for front-line tasks in the Burma jungle.

Often in the jungle, communication between forward positions is so difficult that it is impossible to get the pigeons from the loft to the point where they can be released with messages. The Indian Signal Corps has trained a number of pigeons which will fly from the loft to the forward position and bring the message back, and as an extension of the idea will take a message and bring back the reply! Hence they are called Boomerang pigeons.

This development in homing pigeon training has aroused the interest of pigeon fanciers all over the world. This system proved most useful in the Arakan and is now being adopted all over India.

(*India Information*)

GERMANY

"Spring" Seats for Aerial Ramming Attacks:

The "assault" fighter squadrons of the Luftwaffe, which hitherto have been flying FW 190A8's, will be equipped with the Me 163 "Komet." This was disclosed by an unidentified German radio station which stated that FW 190's were too slow as compared with the British or U. S. escort fighters accompanying the heavy bombers which are the principal targets of the German "assault" pilots.

Like the FW 190A8's, the Me 163's are used for ramming attacks and are equipped with "spring" seats, operated either mechanically or by an explosive charge. Pulling a release lever or pressing a button, pilot and seat are thrown clear of the airplane. By this device, the broadcaster claimed, many pilots' lives are saved while the entire crew of the enemy bomber is killed by the impact of the German fighter.

The Me 262 and the Heinkel He 280 twin-jet fighter also have pilot-ejector apparatus for use in an emergency.

(*The Aeroplane*, Great Britain)

The German Navy:

With the elimination of the *Tirpitz*, the number of large fighting ships in the German Navy is reduced to no more than ten, including the ancient coast defense ironclads *Schlesien* and *Schleswig-Holstein*. These, as well as the pocket battleships *Admiral Scheer* and *Lützow*, the heavy cruisers *Admiral Hipper* and *Prinz Eugen*, and the smaller cruisers *Leipzig* and *Nürnberg*, are all believed to be in the Baltic, like the dismantled hulk which was once the battleship *Gneisenau*. According to Swedish accounts, the cruisers *Köln* and *Emden* are at Oslo, where they have been in use as training ships for anti-aircraft guns' crews in escort vessels employed in Norwegian waters.

(*The Navy*, Great Britain)

HUNGARY

Hungarian Air Force:

Although little has been heard of the Hungarian Air Force during the war, its personnel has proved a useful addition to the depleted ranks of the Luftwaffe, especially on the Russian front, where several of the five air regiments were attached to Luftflottenkommando 4. The formation of a small military air arm was sponsored originally in 1933 by the Hungarian Directorate of Civil Aviation although forbidden by the peace treaties of 1919 to 1920, but it was not until after the Nazi occupation of Austria that first-class modern equipment was obtained. German and Italian aircraft, including the Fiat CR 32 and the Breda 65, formed the main fighter strength, with the Junkers Ju 86K and the Caproni Ca 135bis comprising the Long-Range Bomber Group. For army cooperation duties, the Meridionali RO 37 and the Heinkel He 46 were standard. The Breda 65 was sometimes also used for the same duties.

When Hungary declared war on Russia, several of the air regiments went to the Russian front, equipped with later type German airplanes, probably including the Junkers

Ju 87 and Ju 88, the Henschel Hs 129, and the Focke-Wulf FW 189, for bombing and ground attack duties, and the Messerschmitt Me 109 for fighting. Each air regiment had a strength of forty to forty-five aircraft, and the total force concentrated on the Russian front thus probably never exceeded eighty-five to ninety aircraft.

Allied air attacks on Hungarian targets necessitated the retention of a fighter force in addition to that of the Luftwaffe. For this purpose, some of the older aircraft were utilized, principally the Fiat CR 42 and a few Me 109's.

(*The Aeroplane*, Great Britain)

JAPAN

The Japanese Navy:

Everything points to the fact that in the battle of the Philippines the Japanese Navy received a blow from which it is unlikely to recover. As far as can be calculated from the limited information available, it would appear that its strength has been reduced to six or seven battleships, eight or nine aircraft carriers, twenty cruisers, and seventy destroyers. New Japanese ships mentioned in the official account of the battle include the 45,000-ton battleships *Musasi* and *Yamato*. A third ship of the same type may possibly be nearing completion, but this is by no means certain. Aircraft carriers of the "Hayataka" and "Zuiho" types were also engaged. Though identification of Japanese types is very difficult, both these are believed to be aircraft carriers of the fleet category which have been converted from other types. Some new cruisers of the "Nosiro" type were present; these appear to be ships of moderate size and armament, completed since 1937. There are also known to be a number of large destroyers of recent construction which have frequently been mistaken for light cruisers when viewed from the air.

(*The Navy*, Great Britain)

UNITED STATES

The Fairchild C-82, "Boxcar of the Sky":

Designed exclusively for cargo operations under combat conditions, the new Fairchild C-82 "fork-tailed freighter" is a twin-engined, boom-tailed plane which combines the triple-threat advantages of a cargo transport, troop carrier, and flying ambulance, and possesses speed and range greater than any aircraft of its class in the world.

As a cargo carrier, its low-slung fuselage and rear-door loading features reduce loading problems to moving-van simplicity. The twin tail booms are so high off the ground that ordinary trucks may be backed right up to the fuselage. Then the garage-action doors swing open to reveal an eight-foot square cargo opening, and freight rolls

aboard with speed and ease. In another method, a ramp which folds into the plane's interior when not in use is let down from the fuselage and vehicles such as a Thomas 9E-1 tank or a 75-mm half-track are simply driven into the plane. It would require a major engineering operation to get either unit into any other present type cargo craft. This "boxcar with wings" is fifty-four feet in length.

The troop transport version of the C-82 can seat forty-two fully equipped soldiers and their fighting material.

When the C-82 is used as an ambulance plane, posts and web straps for litters are set up in a double row along the center of the plane without interfering with side seating arrangements.

Power for the C-82 comes from two Pratt and Whitney R-2800 series engines, each capable of developing 2,100 horsepower at take-off, while built-in wing tanks can take the air freighter for about 3,500 miles.

(*Air Force*, Official photo U. S. Air Forces)

A New High-Speed Light Tank:

The new light tank M24, shown above in simulated combat, weighs nineteen tons and has a speed of thirty-five miles per hour. It carries a four-man crew and mounts a 75-mm gun and three machine guns.

(*Army Ordnance*)

New Uses for the Jeep:

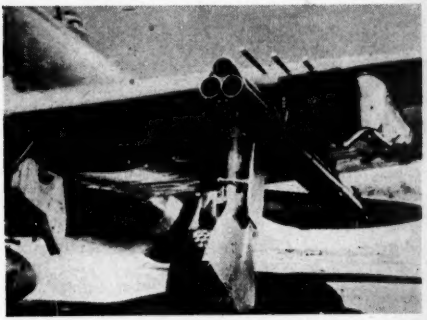
Double-Header Jeeps.—The ubiquitous jeep, with a tandem hitch, now can be used in pairs or sets of three to tow airplanes along taxiways. The hitch, which is being distributed in kits by ASC to all squadrons (two each except heavy and troop-carrier which are allotted three each) on a requisition basis, enables two jeeps to do many of the prime moving jobs for which the 2½-ton truck is designed. Tests indicate the jeeps, in addition to other duties, now can tow planes on concrete or hard-surface taxiways. When the ground is uneven or wet, an extra jeep usually is needed in the procession. The hitch replaces the bumper and becomes a permanent part of the jeep. When not in use, it can be folded back and fastened to a bracket on the radiator grill.

Jeep Flat-Top.—Newest adaptation of the Army's most versatile vehicle is the "jungle jeep." Designed with a flat platform instead of seats, with the engine underneath, this vehicle can carry 800 pounds of personnel, cargo, or supplies in areas inaccessible to larger trucks. A motorcycle-type hand throttle and a hand-operated lever brake are mounted on a swivel tiller bar that replaces the steering wheel. This arrangement enables the operator to lead, follow, or ride the vehicle over rough terrain.

(*Air Force*)

Rocket-Launching Tubes on Thunderbolt:

The Thunderbolt P-47 has a great record in fighting and strafing. It has appeared in several forms, and now the rocket-firing version has arrived. The photograph shows the triple rocket-launching tubes mounted alongside the bomb-rack under the wing of a Thunderbolt of the Eighth U. S. Air Force.



(*The Illustrated London News*)

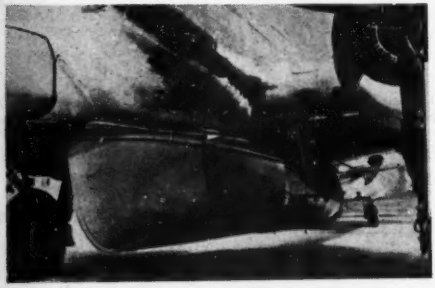
Armor-Piercing Incendiary Bullet:

Army fliers are now using an incendiary bullet with armor-piercing qualities on all battlefronts. It is the most recent development in the running argument beween plane and gunnery designers. Early in the war, self-sealing gas tanks were developed as adequate protection against tracer bullets. Last year a .50-caliber incendiary bullet ended this immunity, exploding in pierced tanks. Enemy answer to this was armor plate for gas tanks and following development on our part was the armor-piercing incendiary, now in mass output.

(*Marine Corps Gazette*)

Airborne Lifeboats:

Flying Fortresses now carry their own lifeboats fitted beneath the fuselage. The United States Army has developed a lifeboat which can easily be carried below the B-17. The boat is released by the bomb mechanism



and is supported in its descent to the sea by three parachutes. It contains fuel, a mast and sails, water-stills, stores, food, and healing equipment. In it, men can travel 1,500 miles in comfort.

(*The Sphere*, Great Britain)

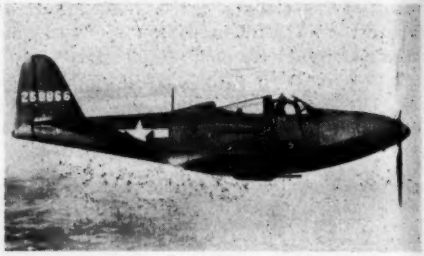
Norden Bomb Sight:

The much publicized and much hush-hushed Norden bomb sight has now been opened to public inspection, incidental to which it has become known that an officer of the U. S. Navy is co-designer and co-patent holder with Carl L. Norden for whom the bomb sight was named. It has been made known also that the accuracy of the first working model of the sight astounded Army and Navy ordnance officers in 1931. The sight was originally invented for naval use. An operator of the sight must make only two computations. One for direction and one for altitude. Both are "fed" into the mechanism and compensated for along with other factors, such as drift, wind resistance, etc.

The Norden bomb sight contains more than 2,000 parts that are being manufactured in five different plants in quantity to equip every multi-motored bomber for Army and Navy. The unit cost is $10,000.

(*Army and Navy Register*)

Bell P-63 Kingcobra:



The Bell P-63 Kingcobra is a larger, more powerful version of the P-39 Airacobra which it will replace. It has a fifty percent greater combat radius than the P-39, a service ceiling of about 35,000 feet, speed of 400 miles per hour, new 1,500-horsepower Allison two-stage engine, and a low-drag, laminar-flow wing.

(*Army Ordnance*)

American "Buzz Bomb":

Production of jet-propelled robot bombs, an American counterpart of the Nazi V-1 "buzz bomb," has begun in the aircraft division of Willys-Overland Motors. The company has been made a source of the "devastating projectiles." Mass production facilities had been installed and production was under way sixty days after receipt of the contract.

The bomb is shipped from the plant complete except for engine and controls. It has a streamlined fuselage twenty-seven feet long, and stubby wings with a span of seventeen feet. The wings are mounted on a bar which passes through the fuselage. The fore section of the bomb houses the magnetic compass and gyro equipment and a "windmill" timing device which is set to throw the plane into a spin when it reaches its target. In the "war head" is the explosive charge.

Welded from five sections of formed sheet steel, the fuselage is thirty-three inches in diameter at its greatest girth. The only aluminum parts are the nose, elevators, and rudder.

(From news reports)

FOREIGN MILITARY DIGESTS

British Airborne Forces

Digested at the Command and General Staff School from an article by Lieutenant General F. A. M. Browning in *The Journal of the Royal United Service Institution* (Great Britain) November 1944.

IT is very difficult in these days for great modern armies to find a flank. The first purpose of airborne troops is to use the flank that is always there—the open flank over the top. There are certain obstructions, like flak, fighters, weather, but it can be used if one applies the principles of air warfare and airborne warfare in the proper way. The second purpose of airborne operations is to use the speed and range, and therefore the surprise value, of modern aircraft, from bases something like 400 miles away, and their ability to put troops down in a very short space of time without the enemy knowing where or when until the last moment. The third purpose, certainly at the time when airborne forces were started in this country, was to be able to storm a series of water obstacles. In 1941, when the First Airborne Division was formed, we were faced everywhere with water obstacles both in the European theater from the Channel to the Mediterranean and in the Far East. Our combined operations when carried out by sea alone have always been a difficult and hazardous task, and the use of airborne troops has proved itself a considerable help in these amphibious expeditions. Last but by no means least, there is the use of airborne forces for sabotage and dropping agents and supplies of arms to the beleaguered countries of Europe and elsewhere.

The ability to do all these things has been made possible only fairly recently with the development of modern aircraft. It is not so long ago since aircraft were incapable of dropping a large number of men or towing large numbers of men in gliders any great distance. But directly the modern two and four-engined aircraft with their carrying and towing capacity were evolved, we began to see the possibilities of putting a really strong, balanced force of all arms down over this open flank.

Responsibilities of Each Service

The responsibilities of the different services at present are quite distinct, and they have been made to work; whether they are the ideal is entirely another matter, but things being as they are in this war there is no sort of idea of radically changing the design of airborne forces. The following are the respective responsibilities:

The Royal Air Force are responsible for producing the bases, crews and aircraft, parachutes and gliders. They are responsible for training the parachutists and training the glider pilots—a clear responsibility. Everything that takes us into the air and lets us down from the air onto the ground is the RAF responsibility. Above all, the most important thing which the RAF has to do is to put the airborne force down at the right time and place. Not an easy task; in fact, the most difficult which it is asked to carry out.

The Army is responsible for producing the men, and the equipment properly modified, to

go into the aircraft at the right time and in the right place. The Army organizes itself and trains itself to do the job when it hits the ground. This organization of the two services has been made to work, and the responsibilities of both are perfectly clear.

The Navy also has responsibilities, and the first and most important one is not to shoot us down. Following on that comes the very important task of giving us a route which will not entail conflicting interests during the flight. This was not realized sufficiently in the attack on Sicily; but in the attack on Normandy we and the Navy made absolutely certain that the route for our aircraft was well clear of the ships so that there was no possibility of any mistake. There *were* one or two mistakes, but on a very small scale. Routing must, therefore, always be tied up and linked up with the Navy whenever there is an amphibious operation in which airborne troops are involved. Another thing the Navy does is to give navigational aids.

Personnel

The parachutist is a volunteer, and he is picked from the whole Army. Even then we have always been up against the problem of getting the volunteer out of the rest of the Army. No commander wants to give up his best men. But we have achieved it to an extent, and you know that the type of man who fights in airborne forces is good.

Our great object is to test him thoroughly before he gets through his training, so that nothing less than the 100-percent man gets through. He has to be of foolproof physique, he must have plenty of initiative, and he has to carry big loads. The last thing we want to do is to put him through his training by nursing him and then let him break down. So he goes through a very hard period of initial training, and if anything goes wrong with him then, that is the time we like it to happen, so that the finished article is as foolproof as a human being can be. In order to qualify for his wings he does eight jumps. Then he goes to his unit and starts his operational training. Every parachutist goes through a curious phase in his life, even experienced officers go through it; they become obsessed with parachuting and do not think of anything after they hit the ground. We have to impress on them that all they have to worry about is what they do after they hit the ground. It takes some time to get them to forget their parachuting and to remember the things they should remember. An already well-trained soldier takes a minimum of three months to become a well-trained parachutist soldier. They are individually-minded and proud of their parachute badge. Once a man has parachuted, he feels he has done something that few other people do willingly. In some way it gives him a sense of superiority over all other troops.

Next comes the glider pilot, who is again a volunteer chosen from the whole Army. He is a soldier because when he hits the ground he may have to fight with precision and skill, although we like the glider pilot back as soon as possible. He, again, is a high class specialist. The RAF has spent a great amount of time, petrol, and money on training the glider pilot, and his wings are of exactly the same value as the RAF wings. He has to do many hours' flying before he is fit to take a full and valuable load of thirty men into battle and land his glider intact. I think we have been proved right in insisting that soldiers should be the glider pilots. There would be no harm whatsoever in the RAF providing the glider pilots so long as they second them to the Army, because not only do they have to be first-class pilots, but they also have to be first-class soldiers. The rest of the airborne division consists largely of old and famous corps and regiments.

All these troops—parachutists, glider pilots, and airlanding troops—have been, from the earliest time we raised the first division, encouraged to think for themselves, to be critical, and to make suggestions. They are always ready to state their own views. They are critical because they have been encouraged to be so. That is right when creating something new.

Material

The parachute itself has been designed to

carry the average man down to the ground loaded up with equipment and ammunition fairly comfortably. There is nothing new about the parachute, it works in the ordinary way, but naturally finality will never be reached and experiments go on. The RAF have evolved very large parachutes; in fact, we can drop some surprisingly large and formidable loads in these days.

Our gliders, both British and American, have proved to be good aircraft in the air, and are capable of being put down safely in very bad country. They have a truly amazing capacity for absorbing shocks before the troops inside are injured. I can say with certainty that both British and American airborne troops have the utmost confidence in them.

The types of gliders normally in use in operations in the European theater are as follows:

a. The Hamilcar glider, which can carry a light tank of approximately eight tons or any other equivalent load.

b. The Horsa glider, which is the British standard glider, and carries a load of three tons.

c. The American Waco, or CG4A, glider, which carries a load of two tons.

I want to emphasize the great difficulty with which the Air Force are confronted in flying in from a low height and landing accurately and up to time large bodies of troops, probably by night. It is a most difficult operation and requires a very high standard of training.

The improvements which the RAF and the U.S. Troop Carrier Command have achieved in the last year are amazing. They have been achieved by two things, first the realization by both Air Forces that the landing of airborne troops is an extremely difficult task and needs highly specialized training of the air crews, and secondly the realization by the Americans that their troop-carrier air crews have got to be trained, not primarily for carrying loads, but basically for carrying airborne troops as their primary role. Since these two things have been realized, both the operations in Normandy and lately in Holland have been carried out with increasing accuracy.

In Holland, although it was by far the biggest operation yet undertaken and the distances and the flak were considerable, the force put down on the ground on the first and second days was ninety-five percent accurate: a very different story from Sicily, when we were supposed to be dropped in two accurately defined areas forty miles apart and were actually dropped fairly evenly distributed on a front of between eighty and ninety miles.

The Airborne Division

The British and American airborne divisions are much the same, except for a slightly different nomenclature and a few details.

To begin with, there are the parachute brigades, which now have a glider element because the parachutist cannot carry all the heavy loads and so has to have transport. As our technique improves, we are bringing down gliders with the parachute brigades. Their strength is approximately 1,600 jumpers.

The airlanding brigades have heavy armament compared to the parachute brigades. They have a large number of jeeps, antitank guns, and mortars, and here is the real punch in the infantry of an airborne division. All the rest of the troops are divisional troops, much like an ordinary division. There is a high proportion of officers and NCO's in all airborne units.

The Artillery, both light and antitank, Royal Engineers, Royal Corps of Signals, Royal Army Service Corps, Royal Army Medical Corps, Royal Army Ordnance Corps, and Royal Electrical and Mechanical Engineers all have parachute elements for certain duties, but are mainly organized on a jeep and trailer basis to go in gliders. All operational loads of the glider element of an airborne division are designed to fit neatly into the glider.

The chief problem of airborne divisions once they have landed is lack of medium and heavy artillery. In the initial stages of an

airborne operation it may be necessary, as it was in Holland, to fight for a day or two without this support. As soon as the artillery of the corps following on the ground comes within range this problem should be solved. We have evolved a good system of forward observation officers with wireless sets who drop with the airborne divisions. These can, immediately the guns are within range, bring their fire to bear in a perfectly normal manner in support of the airborne operations. The same organization in a modified form exists when we land within range of the Royal Navy's guns. This organization has worked well in practice.

During the period before the Army joins up with us, airborne divisions must rely largely on air support. For this we take airborne air support controls and have exactly the same system as the normal divisions.

Planning

The Commander in Chief has at his disposal a certain number of airborne divisions and a certain strength in air lift for these divisions. When he has decided that a certain phase of his operations cannot be carried out without the use of airborne troops, he explains his requirements to the Air Commander in Chief and to the Airborne Commanders (Army).

I must make it clear at this stage that the landing of airborne troops to carry out a task ordered by the Commander in Chief is dependent on the ability of the RAF to do so. Hence, the first investigation and decision must rest with the Air Commander in Chief. The latter, when his Air Force and Army Airborne Commanders and Staffs have, with their specialized knowledge, studied the problem, reports to the Commander in Chief that the operation is feasible or that certain adjustments must be made owing to the air situation.

When the Commanders in Chief have come to an agreement, the air planning remains directly under the Air Commander in Chief. It must do so for the reason that an airborne operation during the air phase is an air operation of the first magnitude. It must include requirements for fighter cover, close escort, anti-flak action, diversions, bombing of airfields and other targets, close support during the landing and after the airborne troops have reached the ground, and air-sea rescue.

On the other hand, the Army planning descends in stages down to detailed planning between the airborne troops and the Army on the ground, in front of whom they are going to land and with whom they will link up. It will be obvious that the very closest cooperation must be achieved in the Army planning right down to the lowest level.

There are certain factors which affect airborne operations basically. The first one is the time factor. When the assault was made on the Normandy beach, the time factor was pretty straightforward; it was a long-rehearsed, long-planned operation. The seaborne element of the armies was expected to arrive in something like eight hours after the airborne landings. That was all very satisfactory. When, however, a landing has to be made such as that in Holland, from twelve to sixty miles in advance of the Army, the timing is an acute problem requiring very careful study. There are two alternatives: either the ground formations which are to link up with the airborne formations must so conduct their operations that their timing depends entirely on the fact that the airborne formations have landed and are actually operating; or the launching of the airborne operation is dependent on certain preliminary operations being achieved by the ground formations; then the airborne formations are not launched until the ground formations report that they are ready for the airborne assault to go in. This time factor must be made absolutely clear.

In the second alternative there must always be a danger of failure in the weather, while in the former, since the airborne operation takes precedence, it is not launched until the weather is suitable. It is of interest to note that never, in any combined operation carried out to date by the navies, armies, air forces, and airborne troops, have the weather

restrictions required for the latter delayed the operations.

I have no time to go into the operations carried out by British or Allied airborne troops in any detail; but the first British operation went by the name of "Colossus"; it was a small affair of the sabotage nature, carried out against a water pipe line in the south of Italy during the experimental stage in 1941. From then on, the airborne operations are common knowledge — Bruneval, North Africa and Tunis, Sicily, Italy, Normandy, and Holland.

Battle Formations of Infantry Units in Breaching Defensive Positions

Translated at the Command and General Staff School from a Russian article by Colonel N. Polev in *Krasnaya Zvezda* (Red Star) 5 July 1944.

THE selection of a battle formation for attack is determined by a series of factors such as the tactical plan, strength of the units, terrain conditions, depth and character of enemy positions, and enemy plan of fire. As the situation on the battlefield is subject to changes, our battle formations will differ depending on the situation.

After the failure of the summer campaign of 1943, the German Command shifted to the continuous trench system in the forward edge and in the nearest depth of the defense, and deeply echeloned all its elements. The Germans began more extensive use of antitank and antipersonnel obstacles in the most varied combinations and through the entire depth of the defense. They also increased the use of massed artillery, mortars, tanks, self-propelled guns, and aircraft.

The battles of the last and the current year show that the German tactical defense has a depth of from ten to fifteen kilometers and is composed of two zones. The first zone, or the main zone, is most strongly fortified. Its depth is four, six, and at times even eight kilometers. The main zone consists of two or three positions. Each position has at least one continuous trench, and the first position in the main zone has two or more continuous trenches. The total number of trenches in the main zone generally varies from three to eight. The second zone, less developed with respect to engineer works, is composed of one or two trenches, usually not occupied by the troops.

Such a deep trench system combined with extensive use of formidable obstacles is characteristic of the strongly fortified defensive zone of the enemy. Its breaching requires adequate battle formations on the part of the attacking infantry. In order to avoid pauses in the capture of the successive positions through the entire tactical zone of the defense, the attacking infantry should be deeply echeloned. This zone usually contains a tremendous number of various battle objectives and targets. It is impossible to affect them continuously along the entire depth and to maintain, at the same time, a high tempo of advance without a constant influx of reinforcements. Pauses cause slackening of the tempo. For example, if the attacker is delayed in the first position, the enemy is enabled to strengthen his resistance in the second position. The forces of the attacker should gradually increase as the battle for the seizure of all the positions of the defense develops, and it is necessary to maintain a high tempo in the breakthrough of the tactical zone of the enemy defenses. That is the reason why battle formations echeloned in depth, as anticipated by our field regulations, are so necessary.

The breaching of a strongly fortified zone requires also a maximum saturation of the infantry battle formations with reinforcing elements. In the offensive operations of the last year and during the past winter campaign, entire units of various arms were assigned to reinforce infantry corps. Infantry

divisions, in turn, were reinforced by artillery and tank brigades and regiments. The attack of one infantry regiment was frequently supported by three to five artillery regiments and by one or two tank and engineer battalions.

During the assault of the positions of a strongly fortified zone, the fire of the infantry itself should be particularly intense and dense. The echelonment of the battle formation does not mean, however, that infantry fire means should be kept in reserve. The principle to be applied here is the same as in the single echelon formation: i.e., a simultaneous and maximum participation of infantry fire means from the beginning to the end of the battle. Regimental artillery and machine guns (including battalion machine guns) of all subsequent echelons are used for the support of the first echelon. They participate in the general artillery preparation. Mortars, for example, are often formed for this purpose in centrally controlled groups, and their fire plays a considerable part in the tremendous mass of fire which is directed at the breakthrough sector. As to the immediate preparation of the assault, it requires the participation of all the heavy weapons of the second and third echelons of the regiments, down to and including heavy machine guns.

The weapons of the subsequent echelons are used, as a rule, in a centralized manner and deliver fire from their positions of departure. With the development of the attack they join the battle formations of their units.

Thanks to this exceptional saturation of the battle formations of our attacking troops with various reinforcing weapons and to the participation of fire means of the subsequent echelons in the simultaneous action against the enemy defenses, there is created a density of fire which exceeds by two and three times any density of fire ever attained during World War I. The effect of this powerful fire on the German defensive positions is tremendous. They are destroyed not only near the forward edge but also in the nearest tactical depth of the enemy defensive zone.

The neutralization, by means of artillery, aviation, and mortars, of the entire fire system of a strongly fortified enemy positional defense should be organized so as to exclude excessive losses on the part of the second echelons. For this purpose, special engineer works are constructed in the areas of departure. They have been widely used in all of our offensive operations.

The danger of mixing up the echelons is eliminated by a thorough organization of their commitment. A strict order of commitment in battle should be worked out. All directions and lines of deployment for each echelon should be accurately indicated. Of course, an iron discipline of movement is necessary in this connection, especially during the commitment of units into the breakthrough. The control should be uninterrupted and firm from top to bottom.

Such a purposefulness of the entire battle formation and of each of its links makes the echelonment in depth the best organized and the most efficient method of breaking through a strong positional defense, provided the battle is thoroughly prepared and cooperation carefully established.

No triteness should be admitted in the building of a battle formation. Battle formations may consist of a single echelon when, for example, intermediate or weakly fortified enemy positions are to be breached. Battle formations, as pointed out in our field regulations, should be echeloned in depth if it is necessary to breach strong fortifications. However, no matter which one of these two methods is used, the commanders will always be confronted with the problem of selecting a battle formation which would be the most adequate under the given conditions. If there is a shallow enemy zone in front of the attacker, single-echelon formation seems expedient. But how should the units be deployed? In "V" formation, inverted "V," echeloned to the right rear, or echeloned to the left rear? If confronted with a strong positional defense, how many echelons should there be in a division and how many in a regiment?

This is particularly important in breaching positional defense developed in depth and

based on a system of trenches. Experience shows the expediency of forming divisions in two echelons; less frequently, in three. The division should operate in a single echelon when the regiments are deeply echeloned. It should be noted, by the way, that in an echeloned regiment the cooperation and the very commitment into battle of the second and third echelons may be better organized than in a division. The same holds true for the control of battle.

During the attack at Orel last year and in the course of the breaching of the Perekop and Sevastopol German fortifications, the regiments of our infantry divisions had a three-echelon formation. The effect, as is well known, was tremendous. During the first two or three hours of fighting our troops seized all the trenches of the first position, and in certain sectors even the second positions of the main defensive zone.

When the tactical plan calls for the exploitation of success on any one of the flanks, it is expedient to form a division in three echelons in order to insure a strong blow on the enemy's flank and rear. The first two echelons apply all their efforts to seizing not only the first but also the second position of the main zone. By doing so they enable the third echelon to exploit the success in the direction of the flank to be attacked. The third echelon strives to upset the enemy battle formations. In the Orel battle, for example, two echelons of the X division, making the main effort, captured the first and parts of the second position of the main zone, while the third echelon suddenly turned to the right and advanced through the rear of a German regiment which occupied defensive positions along the edge of a forest. This regiment, under the pressure of the third echelon of the division and of our frontal units, was partly wiped out and forced to withdraw to the position of its right neighbor. Thus, by the end of the very first day of the battle, the breakthrough on the divisional sector was widened by several kilometers.

Most frequently, however, divisions are formed in two echelons. Such a formation can be used for breaking into the depth and for the exploitation of success in the direction of the desired flank (provided the first echelon can penetrate deep enough to secure the maneuver of the second echelon).

Battle formations of infantry regiments, as was pointed out above, are formed in three and, frequently, in two echelons. Subsequent echelons in a regiment are necessary not only for reinforcing the units engaged in breakthrough operations but also for repelling counterattacks. And counterattacks attain the peak of their strength during the fight for the first position of the main defense zone.

Experience shows that the total number of echelons both in the regiment and the division should be three or four. The idea is to overcome all three positions of the main defense zone. The first position, as the most strongly fortified one, requires, as a rule, two echelons. The general principle to be applied here is this: the more echeloned in depth the defense, the deeper should be the echelonment of the battle formations of the attacking side. During the breakthrough of a fortified German sector at Sevastopol, the X Guard Corps attacked in two echelons. The divisions of its first echelon were also in two echelons, but the regiments of the first echelon, in three echelons.

The depth of a divisional battle formation in the position of departure varies usually between one and two kilometers, while the distance between the battalions, if the regiments are echeloned, averages from 500 to 600 meters.

The formation of rifle battalions depends entirely on the degree of development of the positions to be attacked. The battalions of the first echelon, naturally, seize the first enemy position composed of two or three trenches. These battalions advance, as a rule, in one skirmish line with the mission of seizing the second trench, which is the strongest. The garrison of the first trench is ordinarily knocked out by our artillery preparation. However, special groups should be assigned to clear the trench of the remnants of its garrison.

Should a battalion be given the mission of

seizing all the three trenches of the first position, it would be more expedient to attack in two skirmish lines. The first line seizes the second trench; and the second line, the third one. Experience of the past battles shows that the best formation is the one in which two companies attack in the first skirmish line of a battalion, and one company, at a distance of 150 to 200 meters (in most cases, behind the center of the battalion), in the second.

The second line of the battalion is not its second echelon. First of all, the second echelon attacks in more compact formation, and second, it advances at a greater distance from the units ahead of it than the second line of the battalion.

Of course, companies and platoons attack in most cases in one line. Only when the enemy fortifications are particularly developed do these rifle units operate in two lines. Such was the case, for example, at Sevastopol where the battalions operating in one sector attacked in three skirmish lines: the first was composed of submachine-gun platoons; the second, of rifle platoons; and the third, of platoons assigned to clear the trenches of the remnants of enemy groups.

It should be taken into consideration that one of the elements of the rifle battalion battle formation is obstacle-clearing and assault groups. When the enemy's main line of resistance defenses consist of permanent and earth-and-timber emplacements, and when the battles are fought in populated places, the assault groups advance ahead of the skirmish lines. Part of them may be with the second echelons and even with the reserves. However, if the first position of the enemy defenses consists of field fortifications only, while earth-and-timber emplacements, concrete fire emplacements, and fortified populated places are located in the depth of the defense, it is expedient to place the assault groups in the second echelon. They are used during the approach to the mentioned objectives.

Thus, the varied experience of the past offensive operations shows that breaching a continuous and deep positional defense requires an echelonment in depth of the infantry battle formations and their maximum saturation with reinforcing elements. Any attempt to solve this problem in a trite manner leads to unfavorable results. For example, in one sector of the front a unit attacked in a single-echelon battle formation a strong defensive zone of the enemy. It wedged about 600 meters into the dispositions of the enemy, and then the assault was discontinued because there were no forces available for the exploitation of the success. It is true that the commander of the unit took steps to regroup his forces. But while he was doing this, the enemy was able to organize strong resistance on the next position of the main defensive zone. The favorable moment was lost. Had the unit struck in an echeloned battle formation, the entire tactical depth of the enemy defense would undoubtedly have been affected by the increasing strength of the blow.

In conclusion let us emphasize once more that the most dangerous tendency in selecting a battle formation is triteness. Our field regulations provide us with many types of battle formations, but not for the purpose of applying them without taking the situation into account. One or another type of formation should be selected in strict accordance with the combat mission and with the situation on the battlefield.

The German Front on the Atlantic

Translated at the Command and General Staff School from a German article in *Völkischer Beobachter* 6 December 1944.

No one would have considered it possible that a half year after the invasion and four months after the breakthrough at Avranches nearly all the ports on the Bay of Biscay and several fortified points on the Channel would be controlled by the German Wehrmacht. On the French Atlantic coast alone there is reported to be a 350-kilometer

stretch of coast from northwest of Lorient to south of the mouth of the Gironde which is still barred by German fortifications. Connection with Germany is maintained by means of night-flying planes as well as by submarines. And the astonishing thing about it is that the German soldiers are even able to make long raids into the interior for improving their stocks of provisions. We cite as an example a raid from the area about La Rochelle on the village of Cherisay, nearly 100 kilometers distant. The line of these German strongpoints, far back of the enemy front in the west, begins at the eastern end of the English Channel with the fortress of Dunkirk, which has frequently been showered with enemy bombs and shells. Since the beginning of the month of October, when the other fortifications at the end of the Channel succumbed in the bitter fighting, Dunkirk has stood guard there alone. Most of the civilian population has been evacuated. The enemy has tried several times, and again very recently, to take Dunkirk, but every time has failed with bitter losses.

At the western end of the Channel, German soldiers occupy the English Channel islands of Jersey, Guernsey, Alderney, and Sark off the Normandy coast. Several times the naval batteries on the islands have sunk or damaged British warships. Enemy spokesmen who attempted to persuade our island garrisons to surrender have been refused with studied politeness.

On the French Atlantic coast, the enemy has been able to obtain possession only of the harbor of Brest, at the cost of heavy losses. Above all other former submarine bases on the Bay of Biscay the German war flag still waves. On the southern coast of Brittany we hold the area about Lorient and the Ile de Croix in spite of violent and repeated attacks by the enemy. Several raids have carried our men inland as far as twenty-five kilometers. Also, the garrison of the oft-bombed port of Saint Nazaire on the north side of the mouth of the Loire has made long thrusts into the area back of the coast, in which they were supported by war vessels on the Loire. Not only Saint Nazaire, which during the first World War was the main American port of debarkation, is kept from the hands of the enemy but also, by means of the German batteries, access to the great transshipping port of Nantes farther up the river is barred. Far out before the mouth of the Loire, the island of Belle Ile is likewise defended by a German garrison.

The next fortified German area on the Bay of Biscay includes La Rochelle with an outer harbor, La Pallice, where submarine bunkers

had been built. With the large islands of Ré and Oléron, which lie off the coast at this point, this fortified area presents an obstacle that the enemy has so far not been able to remove. As recently as the latter part of November, assault companies from La Rochelle, in one of their numerous sorties, overran enemy positions twenty kilometers to the north and brought back several hundred prisoners.

Near by is the fortified area of Gironde-Nord. Its nucleus is formed by the fortifications in the vicinity of the bathing resort of Royan. From here also many successful raids have been made by German troops into the area back of the coast, for example against the city of Saujon. The significance of the Gironde-Nord fortifications lies mainly in the fact that, together with the fortifications on the south side of the Gironde, they bar entrance to this estuary and the especially important port of Bordeaux.

Within the fortified area of Gironde-Sud lies Le Verdon, Bordeaux's oceanic "railway station." At these great piers in time of peace the French transatlantic liners tied up in order to save their passengers the additional trip of 100 kilometers to Bordeaux. Today, the German battle flag on the lighthouse shows that the enemy can make use neither of the outlying oceanic "railway station" nor the actual port of Bordeaux.

All our enemies must concede that the decision of the German command to leave powerful garrisons on the French coast has worked out very advantageously for the defense of the Reich. Furthermore, they interfere with the enemy's supply lines and tie up his forces. The resolute defenders, made up of all branches of the service and about half of which belong to the Navy, are kept in contact with the homeland by means of plane. They are kept informed of the course of the war by their own newspapers. Three times each day the "Western Comradeship Service" of the "Greater-Germany Radio Station" brings them personal news from home.

They'll Never Forget Normandy

From an article in *Aim*, army magazine of the British Middle East Command, No. 31, November 1944.

The battle experiences in Northern France of a German panzer division, presented as a top secret report to another relieving formation, and captured by Allied Intelligence.

THE Allies are waging war regardless of expense. In addition to this, the enemy have complete mastery of the air. They bomb and strafe every movement, even single vehicles and individuals. Against all this the Luftwaffe is conspicuous by its complete absence. During the last four weeks the *total* number of German aircraft over the division area was six. . .

From the operational point of view, our own offensive operations by day, after completed assembly, etc.—i. e., attacks prepared all "according to the book" — have little chance of succeeding. The forming up of troops is spotted immediately by enemy reconnaissance aircraft; and if, nevertheless, the attacking troops go forward, they become involved in such dense artillery and mortar fire that heavy casualties ensue and the attack peters out within the first few hundred meters. The losses suffered by our infantry are then so heavy that the impetus necessary to renew the attack is spent.

Better results have been obtained by attacks prepared down to the last detail by assault detachments operating at night on a broad front. These penetrate the enemy positions noiselessly, and in each individual case, surprise and overcome the enemy without the enemy artillery or the RAF having a chance to intervene.

It is an essential duty of the staff planning the operation to put everyone, down to the lowest ranking commanders, completely in the picture. An attack of this nature attains no far-distant objective but proceeds only by

small stages, night after night. In the end, however, it reaches its objective without paying a heavy toll in manpower. The more cunning and variable the fighting, the more successful the operation. This "infiltration" has proved its worth in every case hitherto, as far as this division is concerned. . .

In defense we must reckon with the fact that the attacking enemy simply smashes down the forward battle area with his massed artillery fire and aircraft. It is therefore essential to maintain reserves in at least every battalion sector, which come forward immediately after the barrage has ended. Large masses of troops are not needed for this; a few assault detachments will do. Only a handful of machine guns are necessary to hold the enemy, but they must be there at the right time. But once the enemy has brought up his antitank guns and FOO's [forward observation officers] and dug himself in, it is usually too late. Then the only remedy is to infiltrate on the following night. . .

Our soldiers enter the battle in low spirits at the thought of the enemy's enormous material superiority. They are always asking, "Where is the Luftwaffe?" The feeling of helplessness against enemy aircraft operating without any hindrance has a paralyzing effect, and during the barrage this effect on inexperienced troops is literally "soul-shattering," and it must be borne in mind that four-engined bombers have not yet taken part in attacking ground targets in this division's area.

It is therefore essential for troops to be lifted out of this state of distress the moment the counterattack begins. The best results have been obtained by the platoon and section commanders leaping forward uttering a good old-fashioned "hurrah," which spurs on the inexperienced troops and carries them along. The revival of the practice of sounding a bugle call for the attack has been found to answer the purpose, and this has been made a divisional order. Moreover, the use of the bugle in territory where visibility is restricted enables the troops to know when and where the attack is taking place. An attack launched in this manner is an experience which new troops will never forget, and stimulates them into action again.

The battle outposts and outlying pickets of all kinds must change their positions frequently and at irregular intervals. The enemy, especially the Americans, are experts in creeping up under cover of the hedges and making frequent attempts to dislodge our pickets. They then cover their withdrawal with heavy mortar and artillery defensive fire.

This changing of positions is performed exclusively as battle reconnaissance. The best results are achieved by bringing back prisoners of war even if these disclose hardly anything. Signals interception within the division area gets poor results, since the enemy carries on scarcely any WT [wireless telegraph] traffic, and if he does, it is impossible to determine if this is taking place in front of our own sector. Listening in has so far produced nothing. It is only done for monitoring our own traffic. . .

The enemy's air superiority presents an almost insoluble problem with regard to supplies.

Boldness in Battle

Translated and digested at the Command and General Staff School from a Russian article by Colonel I. Khitrov in *Krasnaya Zvezda* (Red Star) 8 September 1944.

"THE situation" in modern warfare is extremely changeable. It is especially subject to abrupt changes when an enemy fortified zone is breached and the attacking units reach rear areas of the enemy. At this stage the advance develops more rapidly. Because of the frequent and sudden changes in the situation, the enemy's dispositions, strength, and intentions cannot be definitely ascertained and analyzed. Under these circumstances,

the commander does not always receive information even of his adjacent units. He is compelled to conduct the battle on the basis of sporadic and sometimes contradictory information. Some reports may prompt him to be cautious and to await developments while others may promise advantages if acted upon boldly and without delay. The ability to act correctly under such circumstances calls for experience and thorough knowledge of modern warfare.

There are some episodes from the experiences of the "X" Infantry Regiment which are very instructive in this respect.

The regiment crossed a river at night and occupied the western bank. Its artillery stayed on the eastern bank but communication with it was maintained; an artillery officer was with the regimental commander. Part of the infantry heavy weapons had also crossed over. The regimental commander knew that his units had immediately available nine regimental artilley guns, twenty-three mortars (120 and 82-mm), and eleven heavy machine guns.

The staff had no accurate information as to the situation of the unit operating on our right. It was not known whether this unit had crossed the river or still remained on the eastern bank. The artillery cannonade and the rattle of machine guns, however, indicated that our neighbor was battling furiously somewhere along the river. Our left neighbor had not yet reached the river, and only his reconnaissance elements operated in his attack zone. In that direction, small groves and bushes were discernible in the darkness. Our regiment faced open country. Right in front of it there were two populated places on the nearest hills, transformed by the enemy into formidable strongpoints. This was the situation faced by the regiment on the morning of the next day.

It was quite obvious to the commander that the advance should be continued. He did not know, however, whether to attack immediately or wait for the arrival of the neighboring units and of the entire support artillery. He had to figure that out, and to think over the plan of the impending battle. He could advance within his zone straight toward one of the villages occupied by the Germans. There was also another alternative—to disregard the regimental boundary and launch the attack from the zone of the unit on his left. Finally, the decision adopted was to advance at once and use the outflanking maneuver. The main force of the regiment was to advance through the zone of the unit on our left so that moving through groves and bushes it could get around the strongpoints. Fire support for this action was to be provided by the infantry means. All the regimental and a considerable part of the battalion mortars were left at the disposal of the commander to enable him to produce an effective concentration of fire if necessary.

The regiment resumed the advance. The mortar and close-support artillery suppressed the German defense. The infantry went around and launched an attack on the nearest village from the flank. While the battle for the first village was in progress, the support artillery got ready for action. Further advance and the attack on the second village was carried out in cooperation with the artillery. The neighboring units had also caught up with the regiment. The attackers now resumed the advance along the entire front.

Before drawing any conclusions from this example, let us examine another episode from the battle experience of the same regiment. The regiment was pursuing the enemy assisted by a small tank unit. Tanks carrying infantrymen were moving ahead of the regiment when they approached a large river. Scouts reported the presence of strong enemy screens covering the approaches to the river. Soon the leading vehicles were fired upon by antitank artillery, and several enemy guns began covering by fire the entire zone of attack of our regiment. By that time, the regimental commander and the advance elements had reached this area. Only a rifle battalion and ten tanks were ready for immediate action. The remainder of the regiment and the artillery were still under way and could not reach the bank of the river for two or three hours. In this situation the commander

was confronted again with the same problem: to engage the enemy immediately or to wait for the arrival of the other battalions and the artillery—to be bold or cautious. The commander chose the first alternative.

The attack started. The tanks moved out first, firing as they advanced. The infantry followed in skirmish lines. The number of German fire means participating kept increasing. There must have been at least a battalion of artillery guns firing at the tanks. The first attempt to pierce the enemy covering force was unsuccessful. The regimental commander then decided to change the direction of the advance. The tanks and infantry went through the woods and reached the river. Advancing along the bank, they hurled the Germans across the river.

Our scouts went out immediately to look for crossings and to gather local materials for crossing. The commander detailed a group of men with an officer in charge to swim across the river and find out whether the western bank was occupied by the Germans. The group reached the opposite bank all right and came back in a few minutes. The bank was not occupied by the enemy. Using materials at hand, a group of riflemen crossed over and established a small bridgehead.

The entire regiment crossed the river at night. At first it occupied the lowland; then attacked rapidly and captured a few hills near the river. The crossing of the river was so successful that all the units of the division used the same crossing.

Both of these episodes have one feature in common—boldness of plan. In each case the commander chose the course of action which, at first sight, appeared to be the most dangerous. In the first example, he started the attack on the German defenses without waiting for the artillery and advanced with the main forces of his regiment through the zone of the neighboring unit. He was not afraid of widening the sector of operations and of advancing with an open left flank. In the second example, the commander started advancing with but one battalion and the tanks; he did not wait for the arrival of the remainder of the regimental forces. In both examples, the commander acted swiftly and achieved victory. It was not just luck. Boldness and taking chances were based on a correct estimate of the situation and skilful use of the forces and weapons available.

When the attack is made on a broad front and the enemy forces have been badly mauled, bold action is justified. The commander of the "X" Regiment knew this. The Germans were retreating along the entire front. They had suffered heavy casualties. Fear of encirclement haunted them and affected combat decisions of their officers. All these favorable conditions were utilized by the commander. When he advanced along the bank of the river to bypass the German covering forces, he intended to press the enemy into the river. Even if the Germans had had more forces here than it was expected, the launching of the attack by one battalion before the arrival of the main force was the correct thing to do. The same results would certainly have been attained somewhat later by the attack of the main force.

The tendency of the regimental commander to assume justified risks is noticeable in his other actions. When he cannot use his artillery, he figures on using infantry fire means to the fullest extent. When advancing with an open flank, he takes all measures of combat security. During the attack on the German strongpoints on the western bank of the river, strong screening forces were posted on the open left flank of the regiment. They were composed of infantry and antitank weapons, mobile outguards, reconnaissance elements, and stationary outposts.

A daring plan should be based on rapidity of maneuver, and maneuver must be combined with the use of artillery and infantry fire means. Now as never before, loss of time leads to the loss of advantages already gained; and vice versa, daring and bold actions enable the commander to gain time and overtake the enemy. Quickly developing engagements, sudden changes in the situation, and all other factors of modern mobile warfare require of the commander the ability to perceive new symptoms in the situation quickly and to react to them immediately.

Arnhem

Digested at the Command and General Staff School from an article by Lieutenant Colonel Alfred H. Burne in *The Fighting Forces* (Great Britain) December 1944.

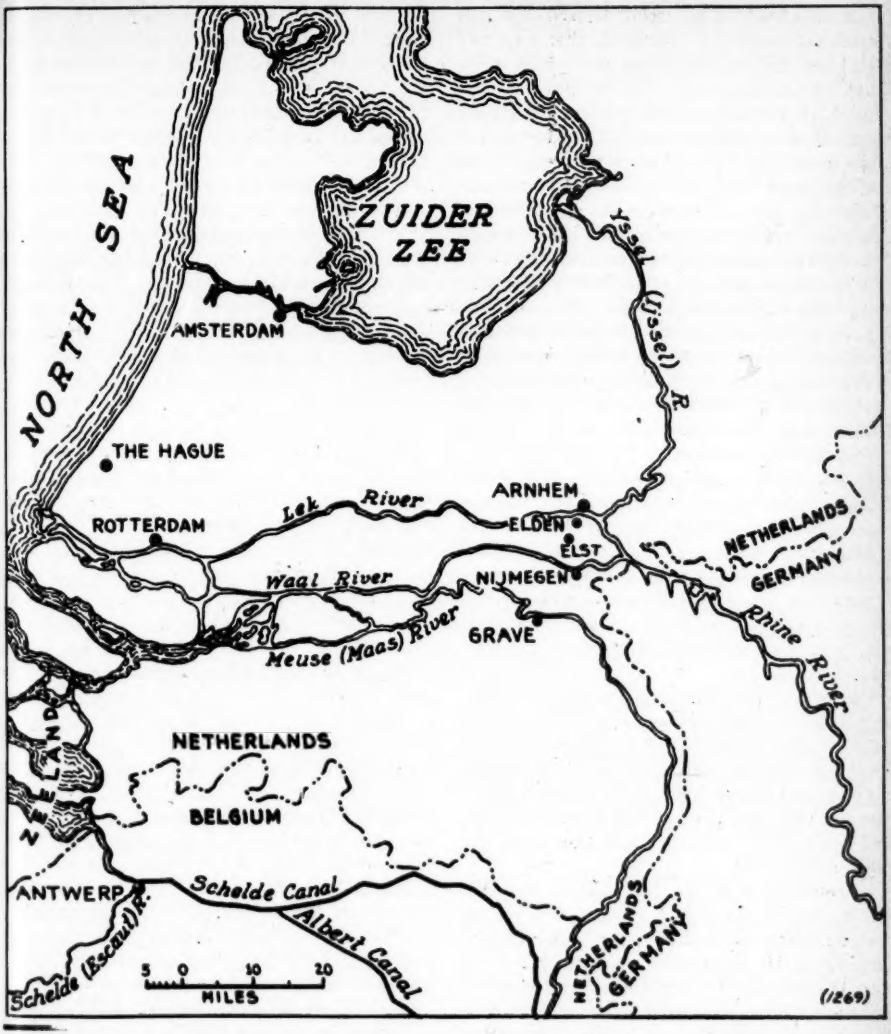
FIRST, a brief narrative, starting from the moment when the British Second Army reached Antwerp. A period of a few days was required to amass stores, and in a surprisingly short time the advance was resumed. The first two water obstacles of any size were the Albert and Schelde Canals (see sketch). The former was the biggest obstacle. Constructed just before the war, nominally as a commercial canal connecting Antwerp and Liege, it was in reality a water defense for Belgium against Germany. It did not delay our Second Army, which rushed it under cover of darkness—a notable feat of arms. The Schelde Canal (wrongly called Escaut Canal) was also crossed without delay, and the road lay open to the Meuse. This was the signal for the airborne landing, and we must now outline its plan.

In front of the Second Army were three rivers, each with its bridge—the Meuse, bridged at Grave; the Waal, bridged at Nijmegen; and the Lek, bridged at Arnhem. The three airborne divisions each had one of these bridges as its objective, the two southern ones being allotted to the two American divisions, the Arnhem bridge to the British 1st Airborne Division. In addition, a Polish Parachute Brigade was to drop between Arnhem and Nijmegen, with the object of linking up with the Arnhem force, across the bridge if possible; failing that, to the west of the town. (There were, in fact, three bridges at Arnhem: road, rail, and a flying bridge constructed by the Germans.) It has not been officially announced whether the ultimate objective was the Zuider Zee or a direct advance into Germany. If the latter was the intention, it should be noted that after crossing the Lek at Arnhem there remained another *and a wider* river, the Yssel, which is indeed as wide as the Thames at London Bridge. This river, curiously enough, has been almost ignored by the press.

The landing at Grave was successful, the bridge being promptly seized. Our Second Army, advancing thirty-seven miles in two days, quickly joined the Americans. The other U. S. A. division was not so successful, but our troops rapidly linked up with it, and the Grenadier Guards, with splendid dash, rushed the bridge, which henceforth is to be known as Grenadier Bridge. Some U. S. A. airborne troops, crossing the river also with great dash and approaching the bridge from the west, no doubt contributed to this great success.

Our 1st Airborne Division (two brigades) landed about eight miles west of Arnhem, on the northern bank of the Lek, and one brigade made straight for the Arnhem bridge, which it seized and held for three days. Next day, Monday, the third brigade landed. So far so good. But now trouble began. It happened that, quite unbeknown to us, two panzer divisions were resting behind the line, in the neighborhood. They promptly mounted a counterattack shrewdly directed at the junction between the two brigades, penetrated to the river bank, and thus split our force in two. It was thus impossible to form a large divisional area in which landing grounds could be made. To add to our misfortunes the weather broke and the RAF experienced great difficulty in dropping supplies on to our troops, especially the brigade in Arnhem. They thus became starved both of food and ammunition, and no troops in the world can fight on under such conditions. Their only hope was speedy succor from the south. We must now examine why this speedy succor did not come.

There are two main reasons. In the first place, the Polish Brigade was planned to land on the Tuesday near the village of Elden, two miles south of Arnhem, but the break in the weather prevented a landing till Thursday, by which time the enemy had occupied much of the ground between the two rivers, and had control of the southern end of the bridge. The Poles, therefore, landed farther



west and tried to link up with our men by boat. A number got across after suffering heavy casualties, but it was by then too late to be effective. A further unfortunate result of the two days' delay in landing was that the Germans were enabled to interpose between them and our Second Army, who found them in occupation of Elst, midway between Nijmegen and Arnhem. Our troops swept them away, but the delay thus caused added to the predicament of the airborne troops. But there was a still more important cause of delay. From the Schelde Canal to Arnhem is fifty-three miles in an air line, say sixty

miles by road. This road constituted the "corridor," and for much of the way the width of the corridor was the width of a single road. This road had to be defended from both sides: thus the potential frontage was 120 miles. It was naturally quite impossible to guard all this immense front under the circumstances of the advance, and it is not surprising that it was broken three times. The first break came from the east, and took two days to repair; the second from the west; and the third again from the east. These last two each required about twenty-four hours to repair. During all this time supplies and ammunition were necessarily halted, and as a result our guns which were intervening in support of the airborne troops were starved of ammunition and could only render limited support. Thus the inevitable happened. Our airborne troops, after "fighting like lions" (the German expression), had to cross to the south bank, where they joined General Dempsey's Army.

Judging by ground gained, the airborne operation was eighty-five percent successful, but the failure to achieve the other fifteen percent was a profound disappointment to all concerned.

The aim of the operation, whether to lock up 200,000 Germans in western Holland or to gain a springing-off board for the invasion of Germany, was an ambitious one. If achieved, the prize would have been great. Equally great was the risk. But the courage to take a great risk for a great prize is the hallmark of the great commander.

Of course, one must measure the risk when making one's plan, and foresee everything that one can. In this case the risk appears very great if one assesses it purely by the map. A corridor through enemy-held country sixty miles long and a few yards wide sounds preposterous, and it was indeed absolutely unprecedented. By the map, the enemy should have been able to pinch it off almost anywhere at will, and the student may wonder why it was not cut thirty times instead of a mere thrice. But there were three factors in our favor that reduced the risk in actual fact. In the first place, the very speed with which the thrust was carried out was in itself a form of protection, just as it had been in the thrust for Antwerp. The greater the speed the more is the enemy thrown off his moral balance. The thrust for Tunis on 6 May 1943 was rendered safe by its speed; Germans could be seen quite close to the flanks, but they were intent only on saving their own skins. Indeed, it is quite likely that the attack on the corridor from the west was in reality merely an attempt to escape out of the pocket that was forming. This brings us to the second point—the moral and physical state of the Germans to the west of the pocket. Most of them were the remnants of the Seventh and Fifteenth Armies which had been unceremoniously bundled out of Normandy, northern France, and Belgium into Zeeland. Most of them had escaped by the skin of their teeth, their morale had suffered, they were short of arms and ammunition and hopelessly disorganized. They were in no state to launch a powerful attack on our exposed flank. This leads to the third count—the ability to coordinate attacks on the corridor from both sides simultaneously. This is the essence of operations on exterior lines, and the Germans signally failed to apply it. Coordination implies previous communication and consultations. But how could the Germans on opposite sides of the corridor communicate? Wireless was their only means, with the possibility of it being jammed. It is not surprising, therefore, that there was no semblance of coordination in the German attacks, and General Dempsey must evidently have calculated that there would be none.

Thus the risk was not as great as it appears at first sight, and but for the two imponderables—the weather and the chance situation of the panzers—the operation would, in my opinion, have been completely successful.

The New Western Front

Translated at the Command and General Staff School from a German article in *Deutsche Allgemeine Zeitung* 24 December 1944.

It will be noted that this article appeared a week after the beginning of the German offensive of 16 December 1944, and before our counteroffensive.—THE EDITOR.

FOR the first time, now, observations are heard here and there that many phenomena that are beginning to appear in the theaters of operation of Luxemburg and Belgium constitute a departure from the known picture of the German military machine. It is recalled that during the late summer and autumn weeks an intensification of effort was effected in matters of organization, equipment, armament, and assignment to duty. The conclusion was unavoidable that the charging of Reichsführer Himmler of the Elite Guard with the functions of Commander of the Reserve Army could not be merely a personal change in a post of high responsibility. Since that time, especially in the representative and command functions of the home army, a large number of changes of a fundamental nature have taken place. But the question of responsibility was bound up with a number of measures which were continually being employed and which had the aim of concentrating composition, effort, and missions of the reserve army on the critical objective, and of developing front-line troops and officers to the highest possible stage of training.

This task was extremely difficult, because care had to be employed in the handling of an organism of particular tradition and unusual worth. On the other hand, however, the revolutionary objective required revolutionary measures. Germany had not entered the war with a definitely revolutionary army. She had merely imparted to the traditional instrument of her armed forces the momentum of her new political zeal. But the critical hour of danger had required, to an extraordinary degree, the revolutionizing of this instrument also. Perhaps, up to a short while ago, not only the enemy but also many Germans did not have much of an idea of what the People's Grenadier Divisions were. They considered that it was possibly just one more name born of a situation requiring a new appellation. These divisions appeared to have been thrown together out of dire necessity from the reservoirs of the homeland, and were composed of men with occupational deferment and those of extreme youth. But already in the defense actions these divisions have fought their way to public recognition. Now, when from the bunkers of the West Wall, after military withdrawals and a long period of defense, the new armored divisions have once more gone over to the offensive, the inward and outward aspects of these formations of the Armed Forces of 1944 become more and more clear.

It is not that the whole structure, down to the last detail, has been shifted to a new mode of combat. This was not necessary for the German soldier who in more than five years of attack and defense has accomplished the superhuman. But the war had grown older. It had cost men, those in the bloom of youth and men of experience. Now in its last stage, it needed men and weapons, regardless of organizational obstacles, who would overcome the overwhelming superiority of the enemy by means of individual accomplishment and superior fire power. Germany now needed masses of automatic weapons with which to oppose the masses of human material of the enemy. Such considerations resulted in the organization of the new People's Grenadier Divisions.

These divisions today are really combat divisions. In addition to the larger portion which consists of younger age classes who, for the greater part, come into the grenadier divisions as volunteers, we find the older, experienced men who, perhaps during the first years of the war, made their acquaintance with its modern conditions. The commanders and leaders of the assault divisions have grown younger to a more and more noticeable degree. So

these new formations hardly resemble those of the beginning of the war, especially when one takes account of the number and practicability of their automatic weapons. In addition to this, as the present offensive operations show, the artillery has also become different. And the armored formations are different formations such as the enemy has never met before on the Western Front as regards armament and numbers. The new policies adopted in collaboration with the Air Force take into account the great possibilities of the enemy and, above all else, the new German developments and the effects of the revolutionary long-range weapons. This is an additional proof of how elastically the organism of the German Wehrmacht has developed, during these hard and critical months, into a striking force of the highest order.

Combat Speeds

An article in *The Aeroplane* (Great Britain) 20 October 1944.

WITH the sudden advent of reaction [jet] propulsion into the field of air combat, changes can be expected in tactics and perhaps in armament. Although "gyrones," as reaction-propelled aircraft can conveniently be called, are still in the early stages of their development, the hard-pressed enemy has thrust his first examples into operational service in the hope that they will brighten the singularly dull prospects of the Luftwaffe. The queer little Messerschmitt Me 163 tailless fighter, powered by a single rocket unit within the fuselage, and the Messerschmitt Me 262, powered by two Junkers Jumo 004 gas turbines, have been met recently in increasing numbers. Another two-motor "gyrone" is the Heinkel He 280, with a layout similar to that of the Me 262. Reports from U. S. fighter and bomber crews concerning the Me 163 suggest that, once it has reached interception height, its rocket power is used only intermittently. Thunderbolt pilots have described how the tiny airplane appears to glide until attacked.

Great speed is also the chief attribute of the two-motor Messerschmitt Me 262 fighter-bomber which, since the Allied airborne invasion of Holland, has become a frequent visitor in the area of Arnhem and Nijmegen. With its introduction into the service, the speeds attained in air combat have suddenly advanced beyond the 500 miles per hour mark, and a number of well-known problems have again come to the fore. Clearly, in the "gyrones" flying today, consistent sharp maneuvering cannot take place at full speed. When Tempests recently encountered two bomb-carrying Me 262's, escorted by three more aircraft of the same type, the enemy formation turned as sharply as possible and sped away. A reaction-propelled airplane is not necessarily less maneuverable than its airscrew-driven counterpart (in fact, a well-designed "gyrone" may exceed conventional aircraft in its response to the controls), but human physique cannot stand sharp maneuvering at high speeds. However, observers agree that even when throttled back, the Me 262 requires an unusually large turning radius, which is borne out by the fact that, when Me 262's have attempted to "mix it" with Allied fighters, they have been destroyed.

Sheer speed, although perhaps the most important single characteristic of an interceptor fighter, is not enough. Fast, unarmed photographic reconnaissance airplanes may find the Me 262 a dangerous opponent, but our fighters and bombers have less reason to fear them. Allied air superiority is so crushing that German "gyrones" can only hope to penetrate the fighter screen protecting our bomber formations by high-speed attacks—aerial rapier thrusts. During such "hit-or-miss" attacks, enemy pilots will be fortunate if they can keep an Allied bomber in their sights for one-twentieth of a second. Some idea of what this means can be gained by a

brief consideration of modern armament. In one-twentieth of a second, a Hurricane IIB with twelve rifle-caliber machine guns would score eleven hits or "strikes," a Focke-Wulf FW 190 with four 20-mm cannon and two machine guns would score only 2.9 strikes, and a Mosquito fighter with four cannon and four machine guns would score 5.8 strikes. Without synchronization the FW 190 would score just under four strikes. Rifle-caliber machine guns, although their high rate of fire ensures a reasonable number of hits in the briefest encounter, would have little or no effect on the "tough hide" of a modern heavily-armored airplane. Thus it can be seen that, as speeds increase and armor grows thicker, the number of guns must be multiplied and their caliber increased. A fairly reliable German report gives the armament of the Me 262 as four 30-mm cannon, which sounds devastating. On consideration, however, such armament appears ill-chosen. This reported 30-mm cannon is a new German production, and must be an improvement on any other 30-mm aircraft cannon at present in use. Even so, the number of strikes per second can scarcely be above five, giving the total armament one strike in a twentieth of a second. All this is rather theoretical, but it serves to illustrate some of the difficulties inherent in air combat at unprecedented speeds.

The possibilities of Messerschmitt Me 262's as short-range fighter-bombers were recognized early by the Germans, and a high proportion of those recently encountered have been carrying two 500-pound bombs externally. Speed, once again, may assist them to elude our vigilant defenses, but, unless some effective braking device is available, only the largest targets are likely to be hit. Experience has shown that, faced with fighter opposition, the "gyrone" pilots prefer to jettison their loads and employ their remarkable powers of speed to escape. Hence, their losses have been small, but their achievements have been smaller.

Soviet Artillery in World War II

Translated and digested at the Command and General Staff School from a Russian article by Lieutenant Colonel V. Smirnov in *Krasnaya Zvezda* (Red Star) 24 September 1944.

MILITARY theoreticians, considering the lessons of World War I, had two diametrically opposite points of view with respect to the role of artillery in future wars. Some contended that the army possessing superior artillery with a greater percentage of heavy units would be victorious. Others thought that the artillery would be replaced by tanks, and that its importance as one of the main arms would considerably decrease.

Now, more than a quarter of a century after World War I and in the sixth year of World War II, one can easily see who is right. But it required Stalin's genius and perspicacity to appraise the possibilities of artillery correctly a long time before this war.

As a result, the Red Army had at the beginning of the Patriotic War, along with strong tank units, a powerful artillery with various types of guns, excellent instruments, and well trained personnel.

Massed employment and high operational and tactical mobility, that is, the ability to regroup quickly and to follow persistently the troops on the battlefield, characterized Soviet artillery as early as the middle of 1941.

The Germans did not and could not have anything comparable to this. Considering tanks as the principal shock force, they entered the war with a relatively weak artillery. It is true that the Germans soon realized their error, but they could not raise the standard of their artillery to the level of the Soviet artillery, and up to this day our artillery is superior to theirs in every respect.

Massed employment of artillery combined

with the skilful use of its mobility, fire power, long range, flexibility, and rapidity of fire are in full accord with the nature of the present war.

When the Hitlerites invaded our country, our artillery was one of the most important factors in upsetting the German blitzkrieg—*the artillery proved to be the basic weapon in fighting massed tanks, and the gun proved more dangerous for the tank than the tank for the gun.*

The creation of reliable antitank defense has become the main task of the artillery during this war. New models of equipment and armament have been streaming in a continuous flow toward the front. The organizational and tactical methods of their use in battle have been constantly improved. The appearance of the 76-mm gun (ZIS-3) and the creation of special antitank artillery brigades and regiments should be especially mentioned.

The development of the large-caliber antitank gun capable of putting out of commission a tank with a front armor plate 100 and more millimeters thick, as well as the formation of tank-destroyer artillery units able to stop and knock out enemy massed armor, may be considered among the greatest achievements of the Soviet artillery in the course of the war. All this has been reflected in all the stages of our epic struggle with the German-Fascist invaders. Light mobile units armed with rapid-firing guns with high muzzle velocity executed forced marches covering over 300 kilometers in eight or ten hours. They appeared unexpectedly before the Germans and met their tanks with deadly point-blank fire.

Operating in one-echelon formation, each tank-destroyer regiment can reliably cover a zone two to three kilometers wide and one kilometer deep. An army commander, having at his disposal several of these regiments, can create powerful artillery barriers. These barriers have been used, as is well known, on a large scale in the battle of Moscow, during the German breakthrough toward Voronezh and Stalingrad, in the battle of Kursk, and near Yassy in June 1944.

The battle formations of antitank regiments are, as a rule, covered by artillery fire from concealed positions. The cooperation among all types of artillery strengthens our defense and increases the losses inflicted on the Germans during their attempts to breach our positions.

The artillery has continued to be the basic antitank weapon in the present offensive operations.

The method of opposing a great amount of artillery to large concentrations of tanks is the outstanding feature of artillery action in the present war. The main point in this method is that the artillery does not wait for tanks in any definite positions, but seeks encounter with them. Thanks to a carefully organized reconnaissance, the direction and strength of the enemy is determined beforehand and the artillery is displaced accordingly.

The mobility of the Soviet artillery manifested itself in a particularly brilliant manner in the offensive operations of the Red Army during the last summer. The troops of the 2d White Russian Front [corresponds to army group] covered 600 kilometers in a month, averaging twenty kilometers a day. However, if we take into account that the troops during this month were engaged in many battles, various enveloping maneuvers, and liquidation of German groups, and that frequent rains made the roads hardly passable, we shall realize the greatness of the heroic achievement of the troops participating in this offensive.

Our troops not only pursued the enemy but emerged in his rear, cut his communications, and surprised him by appearing in places where they were least expected. The artillery closely followed our infantry and tanks. It had many heavy guns, but in the rapid advance characterized by fast moving but short engagements, it was the light artillery and tank-destroyer regiments that played decisive roles.

It is difficult to establish the limits of the mobility of artillery in terms of distance and speed. The possibilities are vast. Limitations in this respect are determined by fuel and

lubricants. However, 300 kilometers a day and a speed of forty kilometers per hour do not exceed the capabilities of modern artillery.

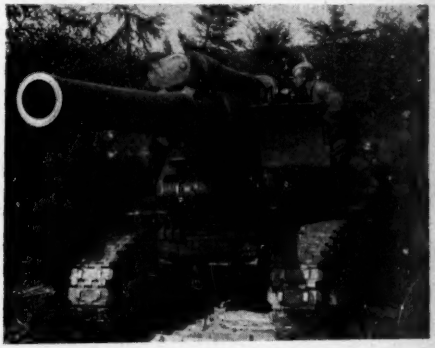
In the July offensive, the 2d White Russian Front, after the breakthrough, had an artillery reserve composed of sixteen regiments, six of which were tank-destroyer regiments. Moving on the left flank (decisive direction) of the front, mostly along two roads, this reserve was always ready for battle. It is easy to see what precision was required in planning the movement and in maintaining control of these regiments on the march, considering that each one was stretched over three and a half or more kilometers. The control, of course, was maintained by radio. The combat orders for the day specified with precision who has to move, where, and when, and the distance to be covered. Particular emphasis was laid on the necessity of the regimental headquarters reaching a definite point by the end of the day. There, the liaison officer discussed with the commander all the problems of the day and those connected with forthcoming operations.

The massed employment of the Soviet artillery is its basic quality in combat. There is nothing new in concentrating the artillery means in the direction of the main effort. *The new trend consists in increasing the tactical density and the number of artillery pieces in the composition of the units in all the sectors of the front, and in the methods of firing.* Nobody now will be surprised by the figure of 200 guns per kilometer of the breakthrough front.

The unparalleled percentage of guns detailed for direct fires is another convincing proof of the strength of the Soviet artillery. This very efficient but dangerous method of firing should be used only by a well organized and thoroughly trained personnel.

Never since the introduction of indirect firing methods have direct fires been used as widely as in the present offensive battles. This does not include infantry guns intended for direct fires, nor fires used in defense. We mean the direct fires of various guns ranging from the 45-mm up to large calibers, used for precision fires in the destruction of enemy defenses.

The strongly fortified German position on the Sapun mountain, for instance, would hardly have been broken through quickly had it not been for a large-scale movement of our artillery into open positions. Two hundred and fifty-six guns using direct fires were assigned to a six kilometer front. This number was not accidental. It was calculated.



SOVIET 203-MM HEAVY FIELD HOWITZER. (SOVFOTO)

On the slope of this mountain, four successive trench lines were located one beyond the other. The artillerymen could see not only the forward edge, but the entire depth of the position. Among the guns using direct fires, twelve 203-mm guns opened fire on strong concrete fortifications an hour before the infantry attack. This direct firing was protected by long-range artillery. As a result, the infantry captured the Sapun mountain easily, suffering only very slight losses.

The principles of artillery attack developed during this war result in the maximum exploitation of the inexhaustible capabilities of the artillery. *The idea of the artillery attack is to clear the way for infantry and tanks by affecting the enemy defensive zone prior to the attack, and to support uninterruptedly the attacking units during the attack, during the breakthrough of the forward edge, and later during the battle in the depth of the*

position. The main task of the artillery throughout all the stages of the attack is the destruction and neutralization of those targets which are most dangerous for the infantry and tanks.

Hundreds of successful breakthroughs of strongly fortified enemy defensive zones show how well our artillery prepares and supports the attacks of our troops. In spite of the fortifications erected in conformity with the last word of engineering technique, our infantry, after the usual short artillery preparation (from thirty minutes to three or three and a half hours), invariably penetrates the enemy position. The short time reserved for the artillery preparation contributes to the element of surprise, and is also one of the characteristic features of modern offensive operations.

In the course of the great Patriotic War, the Soviet artilleryman has acquired tremendous battle experience and has enriched the science of artillery with many new and valuable elements.

Waterproofing Vehicles for the Invasion

Digested at the Command and General Staff School from an article in *The Tank* (Great Britain) October 1944.

THE term "waterproofing" in connection with vehicles which took part in the invasion of Normandy is amplified in the following official story.

In combined operations which necessitate landings on enemy beaches, one of the chief problems confronting the General Staff is the landing of the thousands of tanks, carriers, armored cars, guns, and lorries of all kinds, with their loads and all the other equipment and paraphernalia of a modern army. This is a big undertaking, even when the army has the use of quays and harbors and all the usual unloading appliances, but when every vehicle and piece of equipment has to disembark from landing craft off shore and wade through water, at times deep enough to submerge the engine of a lorry completely, the problem assumes giant proportions.

Almost before the last man of the British Expeditionary Force had arrived back in England after Dunkirk, plans were afoot for our reinvasion of the continent, and preliminary investigations were made into schemes for landing vehicles without the use of ports or unloading facilities of any kind.

Quite early, it was decided to provide a large fleet of flat-bottomed landing craft which, when fully loaded with vehicles, would be able to approach fairly close to shore and would be fitted with a ramp in the bows for lowering to permit the vehicles to run straight off. It was not possible for such craft to get so close in to shore that vehicles could land dry-shod on the almost flat beaches of northern France, so that it would be necessary for the vehicles, etc., to be able to wade from craft to shore through a varying depth of water, depending on a number of factors such as the draft of the landing craft (varying according to the load); slope of the beach; height of the waves; presence or otherwise of holes or runnels in the beach, and so on.

In March 1942, Combined Operations commenced trials at their training center on the west coast of Scotland, to find out whether it would be possible to make a vehicle travel in water.

Some months later, progress had reached the stage where, by the use of various sealing materials, vehicles could be driven in water up to three feet six inches depth for a short time; many difficulties were encountered, however, and the engines constantly filled, due mainly to water getting into the high tension electrical system, with the result that the vehicles "drowned." The corrosive effect of salt water on metal parts and particularly on electrical components then became evident. This proved to be a serious matter, as vehicles which had stopped in the sea were

unfit for use after recovery unless completely overhauled, which often involved the replacement of many parts.

It was seen that the problem was a manifold one:

1. To waterproof the vehicle to enable it to function in salt water.
2. To ensure that no damage was caused during and after wading, so that vehicles when landed would be fit for normal operation at once.
3. To ensure that the vehicles or equipment could run off the landing craft without fouling the ramp.
4. To train drivers to handle vehicles in water, which involves a different technique to normal.

In October 1942, the first waterproofed vehicles to be used in actual operations were shipped from England for the North Africa landings which took place on 9 November. No definite information is available as to what happened to these vehicles individually; it did become clear, however, that the beach conditions in the Mediterranean, owing to the very small rise and fall of the tides, were very different to what was to be expected in the English Channel; Mediterranean beaches, being much steeper, permitted dry-shod landings to be frequently made. As a result, the waterproofing methods did not receive any real testing such as was anticipated on the Atlantic coasts.

It had now been realized that the application of the waterproofing materials demanded considerable skill on the part of the personnel, who would have to be specially trained to the methods and the manipulation of the materials; it was also found that vehicles had to be in absolutely first-class mechanical condition, if they were to wade satisfactorily; it was no use waterproofing old vehicles or those in doubtful running order. Each one had to go through a rigorous overhaul and inspection of the most detailed character before it could be passed for waterproofing.

All through the autumn of 1942-43 a continuous succession of trials were going on, in all weathers, to check up on the methods so far evolved and to overcome the endless difficulties which kept on appearing. One of the major obstacles to progress was that, when a vehicle failed in the water, the engine and components rapidly filled up, so that before the vehicle could be dragged ashore all evidence as to the original fault was obliterated by the subsequent drowning.

It was also found that the slightest defect in workmanship when waterproofing was always liable to cause a complete failure with consequent drowning of the vehicle. Waterproofing was therefore a unique task in that 100 percent efficiency was essential; all work had to be carried out with meticulous care and attention to detail if success was to be achieved.

Owing to the enormous numbers of vehicles and other equipment to be waterproofed for the Normandy landings, it was impossible for the whole of it to be done by experts, as the necessary numbers of these could not be produced in the time available. The majority of the work would, therefore, have to be done by the units themselves, with expert supervision. It was considered that the manufacturers' methods, so far the only ones available, were too difficult to be carried out by the comparatively unskilled personnel in units, with a sufficient degree of reliability, and it was therefore decided to improve and at the same time simplify the methods and materials used so that greater reliability could be obtained by unit personnel.

The first thing was to find a substitute for the plastic material used in the manufacturers' method which would be equally effective but easier to apply. It happened that the U. S. Army was also on the same quest and eventually a waterproof, heat-resisting, and electrical insulating compound was evolved by the Ministry of Supply in cooperation with an oil company, who, when approval was confirmed, immediately commenced production.

Having found the right material for the simplified method, it was now necessary to evolve a new scheme for the many makes and types of vehicles in use in the Army. Each vehicle had to be tested and re-tested

in the sea till a satisfactory result was achieved and a separate instruction pamphlet written.

In July 1943, owing to the ever-increasing volume of experimental work, a coordinating authority in the shape of a special branch of the DME [Director of Mechanical Engineering] Directorate at the War Office was set up, together with a new experimental workshop on the coast. About the same time, two wading trials establishments were set up at selected coastal sites. Here waterproofing methods were tested on a large scale on each type of "A" vehicles, and certain types of "B" vehicles, to be employed in the invading force. Experiments were set on foot to evolve methods for waterproofing the many items of miscellaneous equipment and guns, etc.; also the contents of technical and specialist vehicles. In all, over eighty different types of miscellaneous equipment were dealt with and technical instructions prepared during the same period.

In the preparations for the Normandy landings, most of the waterproofing would, of course, be done by units, but a supervisory and checking organization was required; REME [Royal Electrical and Mechanical Engineers] undertook this and also the responsibility for waterproofing some 5,000 vehicles for the assault force, some 11,000 reserve "B" vehicles, and 3,700 reserve "A" vehicles. Prospecting of sites for depots to carry out this work commenced in November 1943, and some fifteen depots were opened for the purpose.

Some idea of the magnitude of this task may be obtained from the fact that 950,000 man hours of work were involved, apart from adjustments, alterations, etc.

Work began in February and continued in the case of reserve vehicles until well into July. Many of the earlier vehicles had to be done a second time, as it was found that, owing to the impossibility of placing such huge numbers of vehicles under cover, some of the work had deteriorated. Batches of the vehicles were checked from time to time by wading in the sea, an undertaking which was quite large in itself.

As it is now known, the Twenty-First Army Group's forces went ashore in Normandy in most adverse weather conditions, with a loss of vehicles attributable to defective waterproofing of a small fraction of one percent. All the follow-up and build-up vehicles were put ashore across the open beaches for an extended period, until jetties, ramps, etc., could be constructed.

This result could never have been achieved but for the magnificent effort made beforehand over many months by those who developed the technique of waterproofing and who were responsible for its application to the large number of vehicles required for the landings.

Fortress Germany

Translated at the Command and General Staff School from a German article, based on a radio broadcast by General Dittmar, in *Pester Lloyd*, Budapest, Hungary, 9 November 1944.

This article is interesting in the light of the German offensive of the following month, and the Russian offensive which started in the middle of January.—THE EDITOR.

FORTRESS Germany presents today a fortified field of battle which is of such depth that, sooner or later, any enemy attack, be it ever so powerful, comes to a halt.

Fortress Germany—this concept is not to be limited to what is included within the German boundaries—can be regarded as wholly ready to defend itself only when its defense can be conducted to a larger extent in an offensive manner. As yet the Germans are still in a transition state. Nevertheless, numerous conditions are already beginning to develop which will be in Germany's favor. The

operations in the west have so far borne the character of a fight for time and of a severe battle of attrition forced on the enemy.

If the fighting in the low areas of Holland, on the islands of Walcheren and South Beveland, in the triangle between the lower Meuse and the Rhine Delta, and at Aachen was carried on intentionally on the German side till there was no possibility of fighting any longer, it meant that there were very important reasons behind this, closely connected with the German plans as a whole. The Germans have, in this way, achieved many things which could not have been thought of a few weeks back. They provided the Allies—this must not be forgotten—with visual instruction in what is ahead of them in battle.

The quiet that has prevailed in the operations in Italy makes the defense victory that has been achieved there conspicuous. The fact that both British and Americans have broken off their offensive there is a clear recognition of the accomplishments of the German fighters in Italy.

The Balkan area and the southern sector of the eastern front where the Soviet thrust has reached the vicinity of Budapest constitute the German fighting fronts where things at the present time are farthest from stabilized. The Germans take the threat to the capital of Hungary, with which they have so many intimate ties, no less hard than that to any portion of German soil.

The typical traits of the battle for the Fortress Germany have already been shown in the battle for East Prussia. Here the attack of greatly superior Soviet forces has been brought to a halt by the German defense system. The relatively quick recapture of Goldap has also proved the power of the German troops in attack, who in this case particularly were fighting for house and home, for wife and children. The vain attacks of the Soviets in the Kurland area form a significant complement to the picture of the fighting in the northeast, for they reveal just as clearly a general let-down in the Soviet attack ability as they constitute an outstanding testimony to the valor of the German troops who are engaged here.

All things considered, the Fortress Germany is the perfect basis for successful combat operations. It is true that there are still many requirements to be met before Germans will be able to speak of a rise in power again. That is especially true in the matter of aerial warfare, which continually increases in importance. In this field, however, an important point of German effort will be located. The first results of this too are beginning to manifest themselves.

One Decision—Two Plans of Action

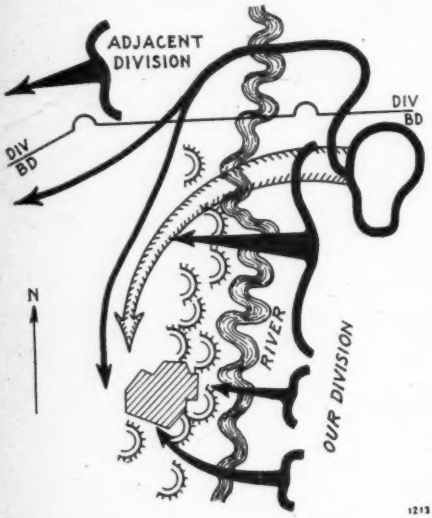
Translated and digested at the Command and General Staff School from a Russian article by Colonel J. Khitrov in *Krasnaya Zvezda* (Red Star) 12 October 1944.

In order to make a correct decision, the commander should study the situation very carefully. Not a single detail should escape his attention, and all the elements of the situation must be properly understood and taken into account.

When analyzing the situation, the commander should attempt to determine the tactical importance of each of the elements comprising the situation and single out those elements on which his decision will be based. This is difficult to do because there are always many important elements to consider and, therefore, many possible courses of action from which to choose. When studying the terrain, for instance, the commander may find it advantageous to concentrate his forces in a certain direction, but when the enemy defenses are considered, he is likely to decide upon an entirely different grouping of his forces. To solve this difficulty, the commander should choose the most important element and base his decision on this element, or incorporate into his decision

an alternate plan of action. The following example will illustrate this idea.

The Germans occupied the west bank of a river (see sketch). Our division was ordered to cross the river and break through the German defenses by a frontal attack. A large German center of resistance on their side of the river was opposite the left flank of our division. It was manned by a considerable force of infantry and artillery, and its fortifications were quite formidable. The defenses



facing the right wing of our division were not so well organized.

The center of resistance included a large populated place. There was a good road net beyond it. As a matter of fact, any further success of our advance would depend on how quickly this center of resistance could be captured, and *this was the first important element of the situation.*

Having recognized the importance of this element, the commander conceived an idea which became the basis of his decision. According to this decision, the main attack was to be launched by the right wing of the division. This would allow us to outflank and encircle the center of resistance and to reach the roads for the exploitation of success.

The commander had another plan for breaching these defenses. This plan was referred to as "Northern," while the first plan was called "Southern." The reason for having the "Northern" plan was this: The offensive in which our division participated was to take place on a broad front, but not all the units were to attack at the same time. The division on our right, for instance, was to start its advance twenty-four hours before us, and *this was the second important element of the situation* which the commander decided to utilize. His reasoning was simple. If the attack was successful, the division on our right would be wedged deep into the German dispositions by the end of the day. This would uncover the left flank of the German defenses and create advantageous conditions for an attack from the north to the south, against and around the enemy's flank.

The attack of the neighboring unit had other advantages for our division. It was logical to expect that the enemy would move some additional troops to oppose that unit. It seemed doubtful, however, that the Germans would commit their general reserve during the first day of the offensive. That meant that the enemy would have to use some of the forces facing our division. There were reasons to believe that in doing so the enemy would weaken primarily that sector of his defenses which was selected for our main attack.

We can see now that both of the commander's decisions were quite logical. The main idea of the alternative plan was that considerable forces of our division would cross the division boundary and follow the advancing units of the adjacent division, thus penetrating the wedge extending into the enemy's dispositions. Then one attack could be launched to the south and one to the west or southwest.

Both variations of the decision were approved by the higher headquarters. It was now necessary to regroup the units of our division so that attacks could be launched in accordance with either of the plans without any additional regrouping of the units. For this reason, a strong force was concentrated

in the northern half of our zone. This force could launch an attack straight to the west, or move to the north first and follow the units of the adjacent division. Our division, by the way, in addition to the main attack by the right wing, was to attack in several other places along the division front.

The attacks of the adjacent division began quite successfully. The first lines of trenches were broken through, and the troops were rapidly penetrating into the enemy's dispositions. The enemy's flank was already uncovered. By the end of the day, our division commander was convinced that the situation was really favorable for the employment of the "Northern" variation of the decision. Finally the adjacent division had made a breach through the German defenses, and our division was all set to carry out the "Northern" plan of attack.

By forced marches, our troops were moved into the zone of the adjacent division. At night, they entered the gap and occupied their line of departure.

In the morning, our division attacked all along the front. Frontal attacks merged with the flank attacks launched by our northern force. This force moved rapidly, attacking to the south, southwest, and west.

The latter force had recrossed the division boundary. One group attacked southwestward, cooperating with the adjacent division; the other group, containing infantry units and self-propelled artillery, attacked southward, its first attack echelon consisting of self-propelled guns carrying submachine gunners. It quickly reached the populated place and cut all roads to the west of it. Simultaneously, several units attacked the populated place from the east and southeast. It was soon captured and the enemy routed throughout the entire zone of our division.

The commander's decision was correct. He had correctly appraised the situation. He had recognized the two important elements of the situation, but inasmuch as both elements were equally important, his decision anticipated two different plans of action, and the outcome of the attack of the northern division determined which plan to employ.

Organization of Mass Bombing Attacks

An article by Air Chief Marshal Sir Arthur Harris in *The Journal of the Royal United Service Institution* (Great Britain) August 1944.

THE organization of a mass attack by Bomber Command of the RAF is never a mechanical or repetitive task. Each attack is a battle of wits against a vast and highly-organized army of technicians, and is invariably planned with reference to the particular circumstances of the night or day—circumstances which are most unlikely to repeat themselves on any future occasion. This is true of the strategic bombing of German industrial cities: changes of weather or new technical devices which lead at once to a revolution in tactics will make one air battle over a German city totally different from another. The Battle of Hamburg, fought during a week of ideal bombing weather and against a night fighter force which had been temporarily disorganized, had very little resemblance to the Battle of Berlin, the first major assault to be carried out in the invariably unfavorable weather of the winter months and one which had to be made in the face of a reorganized and reinforced air defense. Range, weather, the relative as well as the absolute strengths of the opposed forces, and the nature of the target were entirely different in the two battles.

The difference between one attack and another became even more obvious when we had to divert some of our effort from the long-term strategic bombing of German industries to the more immediate strategic aim of destroying the enemy's defenses against the invasion of France. However different the other factors might be, the targets attacked in 1943 usually had in common that they were both large, fully built-up areas. In the winter and spring of 1944, as

the first stage of the Battle of Berlin was drawing to a close, Bomber Command had to reorganize its method of attack in order to accomplish the destruction of targets, such as railway yards, ammunition dumps, or military depots, covering only a comparatively few acres. Later still, as the day of invasion approached, the objectives became as small as a battery of four guns or a row of wireless masts—units in the German defensive system which it was vitally important to put out of action during the critical hours of the landing. The flexibility of our organization had never before been so thoroughly tested, especially when it is remembered that at the same time it was necessary to continue the strategic bombing of large industrial areas in Germany to prevent the recovery of essential war industries. On one night, Bomber Command would be dropping two or three thousand tons of high explosives on a variety of small but vital targets in France, and on the next night the 800 acres of Krupps, together with other areas in Essen, would be attacked by the same force carrying the same weight of high explosives and incendiaries.

In general, organization has followed experience in battle; it has not been our practice to work out a system of attack without testing its efficiency, usually on a small scale, on actual operations. In 1941 new equipment was developed which, it was clear, would enable the timing of our attacks to be far more accurate than before: it would now be possible to make sure that each squadron of bombers reached a given point over enemy territory at a given time which could be decided to within a minute or two. In consequence, the attack could be far more concentrated in time, and as a result in space, than ever before. This equipment was first tested in a few aircraft flying over Germany, and when the result of the test was known it was decided not to use it again until a considerable striking force could be equipped with it. Then, in the spring of 1942, the first "saturation" attacks were planned on a scale which was large for that time. The arrival of each single aircraft over the target was detailed to the minute and the aim was to get the whole force over the objective in the shortest possible time. From the small-scale tests in 1941 there sprung the major attacks of 1943—far heavier than 1,000-bomber attacks of 1942—which swamped the passive defenses by raising hundreds of fires in a few minutes and the active defenses by preventing them from concentrating on single bombers one after the other.

The shorter the attack, it has been found, the longer the work of planning. But plans cannot be worked out in detail long in advance and at leisure for an attack in hypothetical weather. As soon as we know the weather forecast for the night, usually early on the previous morning, the target is decided, and then follows a period of intensive work by my staff officers. They fix the heights at which the various types of aircraft are to fly, time the arrival of a thousand aircraft over the target at the right moment as decided by the weather and other factors, plan the route or routes, and arrange the phases of the attack to ensure that there are no collisions among the crowded aircraft and that the bombs from one aircraft do not fall on another flying at a lower height. Moreover, it is not only over the target that, by careful planning, the aircraft must be kept together; if any of the bombers should straggle at any stage of the route there and back over enemy territory the risk from fighters or flak would be greatly increased. The marshalling of a thousand bombers with such precision during the whole of a journey of more than a thousand miles, in darkness throughout, and often in or over cloud, requires not only extremely detailed organization but also a thorough understanding of advanced scientific technique. As the offensive has continued, it has been found more and more necessary to centralize the planning of operations. At the beginning of the war it could often be left to each bomber group to choose its own route and time over the target within certain limits, but now this would lead to hopeless confusion; the place of each bomber squadron throughout the operation must be decided by staff officers

who see the great and intricate plan as a whole. It must also be remembered that each decision about the route, the timing, or any other detail must be made not only in such a way that one piece of the puzzle fits in with all the others; the enemy is there also, and his presence forces on us an intricate balance of mutually incompatible advantages. The route, for example, must always be a compromise—a balance of three main principles: it must be as direct as possible; it must avoid defended areas; and it must deceive the enemy so that he does not know where the bombers are going as soon as they reach his coast or what course they will follow as soon as they have attacked the target.

Just as the mass attacks on German industrial cities were planned and organized after various techniques of navigation and bombing had been tried out by small numbers of aircraft in actual operations, so the tactics of Bomber Command's attacks on the German Army's communications, supplies, and defensive works in France were developed from the experience of a small number of crews who attacked German aircraft factories in France in the winter of 1943-44. In 1943 the growth of the United States Air Force, equipped with heavy bombers designed for daylight work, enabled Bomber Command to neglect the bombing of individual factories, which the Americans did extremely well, and concentrate on the chief industrial areas in Germany. But when the invasion of France was impending, both the Allied bomber forces would be needed to take part in the vast task of disorganizing the whole railway system of northern France and opening a way through the Atlantic Wall. Moreover, there was an urgent need for the enormous weight of bombs which the Lancasters and Halifaxes of the RAF alone could carry—the bomb loads would, of course, be even heavier on short-range attacks on French targets than they had been in attacks on distant objectives in Germany. The striking force, therefore, had to learn a wholly new technique. Immediately after the Battle of Berlin, the most difficult and highly specialized of all the Command's attacks on large industrial areas, the crews had to learn how to get an equal weight of bombs by night into an area one hundredth, or even less, the size of its normal targets. And this had to be done in good or bad weather, if the pre-invasion bombing was to reach the necessary intensity.

The problem, it was clear, could only be solved by exercising an even more rigid control of each stage of the attack, from the first placing of target indicators on the small target to the dropping of the last bombs, than had been used in bombing German industrial areas. At the same time, new methods of marking the targets had to be devised—obviously a system of marking an area of some square miles would be of little use as a pointer to a single building. It was the task of a few Lancaster crews last winter, while the main force was still engaged in the attack on Berlin, to develop and improve methods already in existence in a whole series of attacks on factories working for the Germans in France. The 12,000-pound bomb, essentially a weapon for the precision-bombing of small targets, was often used, and the attacks were uniformly successful. In one instance the Lancasters succeeded in demolishing a small but very important needle-bearing factory consisting of only two buildings, many hundreds of miles from the French coast, and at a time when it was almost entirely hidden in cloud. The technique was obviously suited to the work and at the beginning of March it had been developed to the point where it could be used by hundreds of aircraft.

A thousand or more tons of high explosive bombs were therefore dropped on one railway marshalling yard after another, ploughing up the whole area of the yard, destroying masses of rolling stock, railway tracks, railway repair shops, locomotive sheds, and facilities of all kinds; so that by 6 June the French railways were hopelessly disorganized and reinforcements struggling towards Normandy in the ensuing weeks, with more Lancasters and Halifaxes bombing the lines ahead of them, were delayed and disorgan-

ized and seldom reached the battlefield with their full equipment, or received adequate supplies thereafter.

Finally, in the last few weeks before the invasion, the Command was given the task of demolishing really small but absolutely vital targets, like coastal gun positions or wireless masts. Here, again, a controlled attack by hundreds of aircraft each carrying five, six, or more tons of bombs proved the right method of hitting such extremely difficult targets; the bombs were dropped in an area about the size of a field and the law of averages ensured direct hits on the superheavy coastal guns emplaced there. On the night before the invasion, a thousand four-engined bombers dropped 5,500 tons of bombs and silenced or disorganized the fire of all the ten permanent heavy coastal batteries in the area chosen for landing.

While these new methods of night attack were being developed and used, Bomber Command did not fail to sustain the offensive against industries inside Germany. Very large and vital areas of Frankfurt, for example, were devastated this spring, and another heavy blow at Krupps of Essen destroyed all the repairs that had been made since the plant was first put out of action in 1943. The strategic bombing of German industries, which has so greatly weakened the German armies on all fronts, continued while all the preparations were being made for the final offensive on all fronts. It will continue to the end.

Soviet Navy in the Baltic

Translated and digested at the Command and General Staff School from a German article by Rear Admiral Gadow in *Deutsche Allgemeine Zeitung* 10 October 1944.

WHILE our [German] security forces in the Arctic, along the Channel, and in the North Sea continue their convoy and combat service undisturbed and the submarine warfare has by no means come to rest, attention is drawn to the situation in the Baltic, which is not simplified by the withdrawal of Finland. Since the end of the siege of Leningrad and of the fighting on the Narva front, the Wehrmacht has been obliged to withdraw considerably in the northern sector and on the southern border of the Bay of Finland.

The strength of the Soviet Baltic fleet, according to present observations, amounts to one battleship, two cruisers, two mine cruisers, eleven destroyers, several mine locating boats, and a number of submarines. Not much has been seen of the larger vessels; only the cruiser *Kirow* and a few destroyers have appeared at times in the vicinity of the Narva front and the Karelian Isthmus. The battleship also took a hand in affairs there, from a distance. Few new Soviet vessels, with the exception of speed boats, mine-locating vessels, and the like, have been built during these years of war owing to the damage that has been done to shipyards and other shipbuilding establishments. The 45,000-ton battleship *Sovietskii Soyuz* lies unfinished on the ways. So does an aircraft carrier in the first stages of construction. Of four new cruisers, the *Petrovpavlovsk* was very badly damaged in 1941, while the three others and also from ten to twelve new destroyers appear to be unfinished. Report had it that submarines were built in the Urals and transported to Leningrad.

It is, of course, possible that the construction of many of these new ships has been speeded up of late in order to satisfy ambitious plans which have been revived as a result of the Finnish collapse, and this may also be deduced, among other things, from the appointment of two Soviet Grand Admirals and seven other Rear and Vice Admirals. As regards the combat ability and seaworthiness of the remaining vessels that could be used for war purposes, this should not be estimated as very great after the long period of idleness, yet cautious judgment is urged. The submarines which broke their way out into the Baltic in 1943 were not able to en-

joy freedom for very long and suffered heavy losses. The presence of English or American instructors and advisers is to be considered.

During the period of the siege of Leningrad, the Soviet fleet had altogether but a small water area out of the range of our naval and army coast artillery. With the fall of Viborg, this condition was changed and is being changed still more from day to day. The Finnish naval and coast defense and the Finnish naval forces had their definite part in the blockade of the Bay of Finland. The surrender of the naval vessels and coast fortifications—presumably a fearful moral ordeal for both officers and men—brings both of these, at least in part, into Soviet hands, including the ports of Kotka, Turi, Helsinki, and, if matters go according to the desires of Moscow for the overthrow of Sweden, the Aaland Islands also, so often the object of political contention. No one would expect England today to insist on their neutralization as in 1853 in the Crimean War.

As a result of these things and of the evacuation of Estonian and Latvian bases, important new missions devolve upon the German naval forces in the northern Baltic, as has already become evident in many communiqués. Their advanced forces will have to handle the task of maintaining the blockade and barrier in the Bay of Finland. That already reinforcements have been assigned, which even now are active, can be perceived from the mention of submarines and larger war vessels in operations along the coast. Thus, in the fighting at Tukkum and Kemmern, west of Riga, naval artillery was able to intervene and contribute to the reopening of the interrupted land connection. In the evacuation of Baltic cities and the removal of troops, guns, equipment, and wounded by sea, all the available transport equipment, together with adequate convoying forces, were employed. At the same time, one sees the enemy aviation from the west occupied with the attempt to make the waters impassable as far up as Memel by dropping mines and destroying the ports in terror attacks. Danish and Swedish vessels plying the waters are equally exposed to attack and must maintain constant protection. The convoy vessels employed in this service, however, in cooperation with the combat formations in the Baltic, will be able to handle the increasing task and will be able to hold our northern and sea flanks just as the army holds its barrier in the east and west.

The Art of Pursuit

Translated and digested at the Command and General Staff School from a Russian article by Colonel P. Boldyrev in *Krasnaya Zvezda* (Red Star) 18 October 1944.

IN THIS war, because of the enemy's mobility, weapons, and mines, pursuit has become a difficult type of operation requiring strenuous effort on the part of both commanders and troops.

The Bobruisk operation is one of the most instructive examples of pursuit. The pursuit of the enemy in this operation was planned in advance by the staff of the Front. The plan of the operation, in addition to various missions for the breakthrough and for the encirclement of the Bobruisk enemy group, specified in what direction and strength subsequent pursuit was to be organized. Missions for all large mobile groups were worked out. The plan also specified which aviation and ground units were to support these groups, and contained pursuit missions for large units such as divisions. Special attention was given to supply problems and to various signals to facilitate cooperation. The depth of pursuit during the first stage of the operation was planned for eighty to a hundred kilometers.

All operations of troops assigned to pursuit were carefully rehearsed in the course of field maneuvers organized by the Front Headquarters. The troops were given practical instruction in operations of advance elements

in pursuit, cooperation among infantry, tanks, and aviation in liquidating encircled enemy centers of resistance, consolidation by the infantry of captured positions, etc.

As a result of this thorough preparation, the pursuit of the enemy throughout the whole operation was carried out smoothly and in an organized manner. The commanders and their staffs were able to secure in advance correct cooperation among all arms, and exercised an uninterrupted control of the battle. Knowing their missions, they displayed great initiative and acted skilfully and decisively.

Of great importance to the organization of the successful pursuit was the special battle formation of the troops before the attack. South of Parichi (see sketch), for example, where, according to the plan, a mobile group was to be committed, large forces of infantry and tanks constituting the breakthrough (attack) echelon were concentrated on a narrow front. Behind them was massed, in full battle readiness, the tank unit of General Panov. At a distance of three or four kilometers from the tanks was the mobile group of General Pliev. The attack of the troops in this direction was supported by a great many aircraft and the main force of the artillery of the Front. This formidable breakthrough force and the deep echelonment of its battle formation had secured not only the successful breaching of the German defenses, but also the incessant and ever-growing force of the attack fed from the depth of our dispositions.

On the very first day of the offensive, 24 June 1944, the infantry and the tanks broke through the solid defenses of the enemy and reached the firing positions of his artillery. The tank unit of General Panov was then committed. It attacked the nearest reserves of the enemy, widened the breach toward the flanks, and by the end of the day had deepened it up to twenty kilometers. The next day, while the tanks and infantry were rapidly exploiting the success to the north, General Pliev's unit was moved into the gap. The Germans had been badly mauled; they offered no organized resistance. The mobile group, eluding serious engagements with the enemy, began pursuing small retreating groups. It covered more than fifty kilometers during the first day and arrived at the approaches to the city of Glusk on 26 June, the third day of the operation. Thus, all roads leading to Bobruisk from the south and southwest were cut.

The pursuit of the retiring German troops was conducted on a wide front and in several directions. The tank unit of General Panov moved swiftly to the north toward Bobruisk, the mobile group of General Pliev went northwestward to Glusk, while another tank unit (General Bakharov's) outflanked Bobruisk from the northeast. The enemy defensive front was quickly split into separate centers of resistance, which were encircled and destroyed by the infantry units following the tanks.

Our tanks and infantry, with part of their forces, constantly attacked the enemy's flanks and cut off his lines of retreat along the parallel roads. Thus, the tanks of General Panov's unit, moving to Bobruisk, struck eastward and cut off the enemy group in Parichi. This group was soon encircled and destroyed by our infantry.

The mobile units of the Front concentrated on one mission, i. e., complete encirclement of the main force of the 9th German Army in the Bobruisk area. They tried, therefore, to reach Bobruisk on the heels of the retreating enemy as quickly as possible and to complete the ring of encirclement. This was done on the fourth day of the operation, 27 June.

What determined such a high tempo in the movement of tanks and motorized infantry in pursuit? First of all there was the fact that the tanks and motorized infantry pursuing the retiring enemy advanced rapidly and boldly and were often fifty or more kilometers ahead of their infantry. The infantry tried not to lag behind and quickly cleared occupied areas of the remnants of enemy troops. But the main point was that the action of tank units was very independent in character. They had strong self-propelled artillery, antitank guns, antitank riflemen, sappers, and submachine gunners. From the air, all tank operations were well protected by fighter aviation.

When the encirclement of the tens of thousands of German troops was completed, the main forces of the Front avoided protracted engagements and continued without delay to pursue the remnants of the enemy forces. Soon afterwards, all our mobile units were replaced by infantry and moved in the same direction.

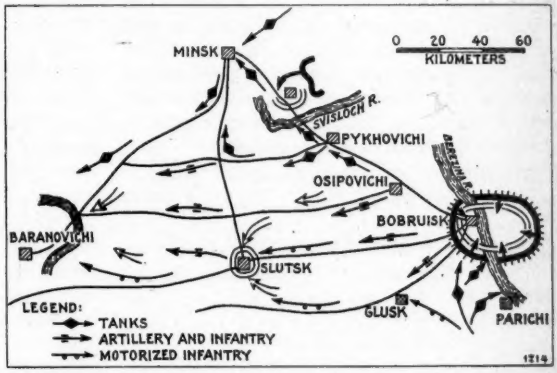
It is very significant that, as early as 27 June, two-thirds of the forces of the Front had been engaged in the exploitation of the success in the direction of Minsk and Slutsk, and only one-third (the unit of General Romanenko) was left behind to liquidate the encircled German group. This bold and carefully weighed decision proved to be perfectly justified.

It was dangerous however, to leave considerable enemy forces in our rear for a long time. The Germans were likely to attempt to break out of the encirclement and hamper thereby the further development of the offensive. Therefore, more than five hundred bombers and large units of artillery and mortars were assigned, on the very first day, to liquidate the encircled enemy forces. As a result, the large German stronghold at Bobruisk was fully occupied in only two days.

Subsequently, when the German defense was completely disorganized and the bulk of their forces routed or captured, our mobile units rushed to the main road junctions in order to prevent the Germans from retiring to the west. The area around Minsk was now becoming the decisive direction. It was obvious that a rapid thrust toward Minsk of the troops of the 3d White Russian Front [corresponds to army group] from the northeast and of the 1st White Russian Front from the south would encircle the large German group at Minsk. From Bobruisk, Marshal Rokossovski sent both of his large tank units toward Minsk.

In their attempt to reach Minsk as quickly as possible, our mobile units avoided engagements with isolated enemy groups. These groups were usually surrounded by specially detailed units, while the main force rapidly advanced.

On 29 June on the Svisloch River, General Panov's tanks encountered stubborn resistance on the part of the 12th German Tank Division which had been dispatched here from Minsk. All the attempts to break through the German defense failed. Then the aviation was summoned to the rescue. Self-



propelled artillery also arrived on the spot. Together they took the enemy under an intense fire. Without losing a minute, the Front commander ordered General Bakharov's tanks to go around the enemy defense along the parallel road Slutsk-Minsk, thus encircling Minsk from the south. General Gorbatov's infantry, in a surprise movement, approached the German defenses from the east. Unable to withstand the pressure of our troops, the enemy abandoned a great number of tanks and fled toward Minsk. On 3 July, General Panov's tanks broke into the southern outskirts of Minsk and joined there the tank units of the 3d White Russian Front, thus completing the encirclement of the Minsk enemy group.

The troops of the 1st White Russian Front were not used for the destruction of the enemy forces in the Minsk area, and the commander, having left part of the troops at the southern outskirts of the city, ordered the main forces of General Gorbatov and the

tanks to advance to the southwest, toward Baranovichi. This resolute maneuver prevented the enemy from concentrating his forces for parrying our blows. Disorganized, the remnants of the German troops retired to the west.

Despite its high tempo, the pursuit continued to develop according to plan in all its details. Since the troops of the Front had fought their way in hard battles through more than 250 kilometers for the last ten days, and because the rear installations and artillery were increasingly falling behind, the Front commander decided to continue the pursuit with the tanks, motorized infantry, and cavalry. The infantry units proceeded to the west by regular daily marches.

From the line Minsk-Slutsk to Baranovichi, the pursuit was conducted on a wider front. The troops advanced rapidly along highways and dirt roads in an attempt to comb the approaches to Baranovichi. On the flanks moved the mobile units enveloping the city from the north and south; in the center, the main force of the infantry was in a formation suitable for attacking the German defenses from the march. As a result, when the infantry approached the German defenses near Baranovichi, the enemy flanks had already been deeply enveloped by our mobile units. On 8 July, the city of Baranovichi was occupied by our troops.

The aircraft was the main element of support for our mobile units in pursuit. Cooperation with the aviation was effected through the liaison officers—representatives of the air forces.

Battle experience shows that pursuit operations, regardless of their magnitude or extent, should always be planned. Unplanned action in this complicated type of modern combat may result only in pushing back the enemy or, even worse, in the loss of offensive initiative by the attacker. Of particularly great importance is the establishment of cooperation between the mobile units on the one hand and the aviation and self-propelled artillery on the other, inasmuch as tanks and motorized infantry in pursuit are very frequently separated from their main forces and have to act on their own.

Modern pursuit requires of the troops not only great endurance, but also the ability to fight under a variety of conditions. It is, therefore, necessary to train the troops in rapid outflanking movements in pursuit, encirclement of the enemy, swift liquidation of surrounded centers of resistance, consolidation of captured positions, night operations, etc.

In order to render the mobile units more independent, especially in combat with enemy tanks, they should have, in addition to self-propelled artillery, strong antitank artillery, sappers trained in tank combat and armed with antitank mines, and submachine gunners.

Pursuit, as shown by battle experience, leads to decisive results only when mobile units enter the breakthrough simultaneously and without encountering much resistance, thereby preserving their forces. This can be achieved only by creating a strong breakthrough echelon, which is able to pierce the enemy defense at a stroke and secure the commitment of mobile units into battle. Wherever the breakthrough echelon is weak, the mobile units, particularly tanks, are committed to battle prematurely and instead of shifting to pursuit are forced to complete the breaching of the enemy defenses.

Mobile units in pursuit act boldly and with determination. They do not look back, nor keep in line with the neighboring unit. By vigorous attacks in several directions, they wedge into the enemy defenses as deeply as possible and split them up. Their forward movement should be combined with thrusts toward the flanks. This helps the infantry which follows the mobile groups.

Should the mission of mobile units include the encirclement of the enemy, as was the case at Bobruisk, the tanks participating in the encirclement should be immediately joined by infantry. Then the tanks take off to continue the pursuit.

The operations of mobile units in enemy

rear areas are supported by aviation especially detailed for this purpose.

The correct organization and the skilful execution of pursuit are important elements of the maneuver for encirclement so brilliantly mastered by the Red Army.

Development of Destruction

Digested at the Command and General Staff School from an article by James Barlow in *The Aeroplane* (Great Britain) 27 October 1944.

WHEN the first bomb was dropped, its puny explosion started a new element which was to revolutionize warfare. Who did drop that explosive object is uncertain, although bombs were reported to have been used in the Balkan War of 1912 and before that to have been dropped by Italian airplanes on the Turks in the invasion of Tripoli in 1911.

The vast majority of bombs used by the RFC during 1914-18 were types of 20 pounds and 112 pounds. The 112-pound was considered as the standard "big" bomb, and was used for years after 1918. RNAS aircraft, operating from Dunkirk in 1917, used 65-pound, 100-pound, 250-pound, and even 520-pound bombs, the latter being regarded as enormous at the time. An indication of how far bombing developed is provided by the bomb loads of the IAF during the period from 6 June to 10 November 1918. In 160 day and 390 night raids, 550 tons of bombs were dropped.

After 1918, bomb development did not make progress for quite a while, because bomb aiming and ballistics were being examined scientifically.

High-explosive bombs now employed by the RAF are of 50 pounds (antipersonnel), 250 pounds, 500 pounds, 1,000 pounds, 2,000 pounds, 4,000 pounds, 8,000 pounds, and 12,000 pounds. The bomb experts have increased the power of the air offensive by their work, which has produced "big, beautiful bombs." The special 2,000-pound bomb was first used on the night 31 March-1 April 1941, in an attack on the Emden shipyard district. The explosion of the "cookie" caused houses to take to the air, and the "back room boys" must have been encouraged. Four-thousand-pound bombs, dubbed "Bezirkbomben" by the Germans and "Blockbuster" by the RAF, were dropped on Wilhelmshaven on 8 July 1942, and shortly afterwards the Air Ministry announced their existence, following in September 1942 with the news of the more impressive 8,000-pound explosives. The 12,000-pound "Elephants," used for selected targets, came into use at the beginning of 1944. For attacking enemy armored targets, the 12,000-pounder has been streamlined, fitted with new fins and an armor-piercing nose.

The development of blockbusters was made possible by the existence of aircraft capable of lifting them, with bomb doors and cells capacious enough to take them. New bomb trolleys and means of lifting the bombs into the aircraft and new methods of holding them there had to be designed.

The size of bombs has increased greatly in the past four years. The 500-pound General Purpose bomb measures seventy inches (including fin), and has a diameter of thirteen inches, while the 12,000-pound bomb has a length of 210 inches and a diameter of forty inches. Bombs up to 12,000 pounds may be armor piercing or semi-armor piercing, and for this use have strengthened casings, reducing the explosive content.

German high-explosive bombs include the 50-kilogram, 250-kilogram, 500-kilogram, 1,000-kilogram "Herman," and the 1,000-kilogram "Esau" armor piercer used for anti-shipping. Also sometimes used is the 1,400-kilogram "Fritz" armor piercer, 1,800-kilogram "Satan," and a bomb of 2,500 kilograms. One kilogram weighs 2.2046 pounds. The larger bombs have two distinct fittings, a sky-blue fin of brittle magnesium alloy and a triangular-sectioned metal ring ("Kopfring") around the nose of the bomb to retard its penetration. German fuzes are of standard

size and of compact, delayed action (up to eighty hours) and delicate anti-handling type. Enemy bombs of all sizes are most unshapely and all need fins to stabilize their flight. The 50-kilogram is forty-three inches long (including fin) and has an eight-inch diameter, while the 1,800-kilogram is 147 inches long and its diameter is twenty-six inches.

One of the supreme examples of developed destruction is the FZG 76, the notorious Flying Bomb.

RAF incendiaries, like the explosives, have been developed and are the deadliest in use. Neither the Germans nor the U. S. have used the incendiary as have the RAF, although the enemy made a few outstanding attempts. The RAF bombs, carried in special containers, are released in showers. During an attack they are dropped not in scores, but in hundreds of thousands. The blast from the blockbusters is skilfully blended to spread the fires, and the result is shown in any RAF photograph. A fine "textbook" example of this form of attact was recently demonstrated on Duisburg. Enemy incendiaries are of various small types, the most usual having a small explosive charge which detonates about seven minutes after impact. They are made of electron and filled with thermit.

In their efforts to be unpleasant, the Germans occasionally drop small bombs of the booby-trap nature. Undoubtedly the nastiest of these is the SD 2 or Butterfly, which is three inches long, has a three-inch diameter, and has a sheet-metal wing attached by five inches of wire. Four types of fuzes are fitted: one for a mid-air explosion, one an impact fuze, another may have a delayed action of up to half an hour, and the fourth is an anti-handling. In this latter capacity, the SD 2 is almost impossible to deal with except by giving it a wide berth or gently fastening cord to it and giving it a sharp tug to set it off. It contains about one pound of explosive. Another small nuisance is the SC 10, about fifteen inches long, three and a quarter inches across, and purely an impact bomb. The Italian thermos bomb is a foot-long cylinder with a super-sensitive anti-handling fuze, which is self-destroying after about sixty hours.

Fragmentation bombs were particularly developed by the U. S. These bombs, usually of twenty pounds, may have parachutes fitted to their tails or a delayed-action fuze, the purpose of either being to allow the attacking machine to get clear of the explosion. Carried in clusters, they make scarcely any crater, and the casing fragments make a mess of anything "soft" which is higher than two feet for quite a radius. The 250-pound RAF bomb may also be used against personnel or parked aircraft by having a rod extending from its nose which will actuate the detonator before the bomb penetrates the earth.

The German use of glider bombs is not new, as they had a glider torpedo in 1917, but it was never successful as the Zeppelins which carried such missiles were too subject to retaliatory action.

A number of pyrotechnics exist to aid bombing. The equipment of the Pathfinders includes one of these, the marker bomb, which is a normal-shaped 500-pound case containing small magnesium cartridges which are scattered after the bomb has fallen a certain distance and light up an area for three minutes. Sky markers are similar but remain suspended at cloud level. RAF night bombers also use flash bombs of 50,000,000 candlepower, which operate automatically when dropped. Exploding with a blinding light which lasts for one-tenth of a second, they allow night photographs to be taken.

Aiming always presented a problem. Even now the accuracy is not a hundred percent. Theoretically, a sight works with a precision of ten minutes of arc, which is one-sixth of a degree, giving a lineal error on the ground of approximately 100 feet from 30,000 feet. Allowing for various disturbances, such as enemy fighters, the bomb should arrive within a 600-foot circle, while from 20,000 feet it should fall within a circle of only 200 feet diameter.

A bomb's horizontal velocity at the moment of release is that of the airplane and the vertical velocity is zero, although gravity im-

mediately causes a downward drop, calculated as increasing by thirty-two feet per second, where there is no air resistance. This means that the bomb falls in a curve away from the point of release until it is falling straight down, nose first. If there were no air resistance, i.e., in a vacuum, the bomb would travel forward, remaining under the bomber, and would be directly under it at the moment of impact with the target. Actually, it is slightly behind the bomber, how far behind depending on the air resistance, which, besides gradually eliminating the horizontal velocity, acts upon the vertical motion of the bomb, setting a maximum to it. The bomb, having reached what is called its "terminal" velocity, does not exceed it. The speed of a falling bomb, increasing by thirty-two feet per second, would, if dropped from 40,000 feet in a vacuum, be 1,092 miles per hour, approximately, when the target was hit. However, the air resistance reduces this and its terminal velocity depends upon its shape and weight. All bombs being dropped at present can be heard in the last few seconds before striking and so would not be falling faster than sound (about 770 miles per hour at sea level). In the vacuum of the theorists a bomb falling from 40,000 feet, from an airplane moving at 250 miles per hour, would strike the target after 49.7 seconds about 3.45 miles ahead of a point 40,000 feet below its point of release. Air resistance would increase the time and decrease the distance.

The enormous blast of RAF bombs will cause serious damage in a built-up area in the following proportions: the 2,000-pound bomb will seriously affect 7,396 square yards; the 4,000-pounder, 24,649 square yards; the 8,000-pounder, 47,524 square yards; and the 12,000-pounder, 81,235 square yards. These bombs have been rained down in thousands, and if there are any walls standing in the areas visited, then there must be a terrible amount of writing on them.

Cooperation Between Self-Propelled Artillery and Cavalry

Translated at the Command and General Staff School from a Russian article by Major V. Galkovskii in *Krasnaya Zvezda* (Red Star) 29 August 1944.

This article is published because of the highly unconventional manner in which self-propelled guns were used as tanks. This is especially true in the attack on the city and in the street fighting. It will be noted that the self-propelled artillery pursued the retreating Germans and no mention is made of the cavalry.

If this account is correct—and it evidently is since it is in the Red Star, *official organ of the Soviet Army—it illustrates what initiative and vigorous pursuit will accomplish. After all, in war anything that works must be all right! —THE EDITOR.*

For hundreds of kilometers, the "X" Self-propelled Artillery Regiment fought alongside the cavalry. This was a period of vigorous pursuit of the enemy. Most of the time, the batteries moved through swamps, woods, and other natural obstacles. In spite of this, the artillerymen always managed to help the cavalry through the decisive moments of the battle.

The following example will help clarify the fundamentals of cooperation between heavy self-propelled artillery and cavalry.

After our rifle units had broken through the German defenses and had encircled a considerable enemy group, the "X" Cavalry Division entered the gap and rushed toward the deep rear of the enemy in the direction of the big city. By the evening of the same day, the cavalry units, overcoming on their way isolated and scattered enemy groups, reached a terrain line formed by two rivers. They were met here by a strong automatic, mortar, and artillery fire. Here, as it turned out, the

Germans had brought troops from the rear. At dusk, reconnaissance patrols were sent out to locate crossings and the dispositions of the enemy. During the night, several crossings and bridges on one of the rivers had been located, and our forces were regrouped accordingly.

It should be noted that up to this moment only the cavalry operated in this direction, since its supporting tanks and self-propelled artillery were delayed on one of the preceding water barriers due to the absence of crossings. Thus, the retiring enemy was not being subjected to tank blows. The Germans had counted on cavalry only and had planned their defense of the river accordingly. They also knew that our cavalry would approach the river without its organic artillery, also delayed somewhere on the way.

This assumption proved to be fatal for the enemy, for the self-propelled artillery regiment succeeded, despite all the difficulties, in forcing the water barrier. Having covered more than 200 kilometers in two days, the regiment reached the area, and by midnight two of its batteries were near the river line occupied by the cavalry.

Before dawn, the cavalrymen and artillerymen had worked out a plan for a joint attack and had established signals for requesting and ceasing fires, target indication, etc. Since the enemy did not suspect the presence of the heavy self-propelled guns here, it was decided that they would cross the river first and disrupt and destroy the enemy fire system on the other bank in close cooperation with the dismounted cavalry. As soon as a bridgehead was established, the cavalry squadrons would cross the river and proceed toward the city in several columns, keeping away from roads. At that time, the cavalry was to execute an outflanking maneuver and attack the German artillery located on the highway (the self-propelled guns could not leave the road because of the marshy ground).

At 0400, the batteries of the self-propelled artillery forded the river and suddenly attacked the Germans. The morning mist affected the accuracy of the enemy artillery fire. Our guns crushed, with their caterpillar tracks, the German machine-gun and mortar crews and destroyed them with point-blank fire. Within approximately one hour, the enemy was knocked out from his trenches and hurled back two or three kilometers to the west. At that moment, the "X" Cavalry Regiment crossed the river and rushed toward the city right across the swamps. The self-propelled batteries took the highway.

The Germans resisted stubbornly everywhere. Near a highway junction they even counterattacked, but were rapidly dispersed. After the capture of this road junction, the guns started moving more rapidly. Now they could get off the roads, for the ground here was more suitable for maneuver. Moving across country and taking a short cut, the cavalry, too, reached the main highway. It was advancing now on both sides of the highway, combing a strip two or three kilometers wide, thus protecting the self-propelled artillery from possible flank attacks. Whenever our artillerymen encountered enemy guns, they deployed and quickly smashed them with a concentrated fire. Not infrequently the cavalry squadrons outflanked the German artillery and forced their crews to flee before our self-propelled batteries even approached near enough to have them within their range.

Combining their blows in this manner, the cavalry and the self-propelled guns approached the city. The city had to be stormed. Here the artillerymen went ahead of the cavalrymen again, broke into the city, and captured the bridges over the river, undamaged. This enabled the cavalry units to enter the city without any difficulties.

Inside the city, furious engagements raged for approximately two hours. The Germans had all streets under flanking fires. Cruising along the streets, our self-propelled guns routed two enemy groups in the northern and southern outskirts of the city. The remnants of the enemy garrison were attacked by the cavalry and toward the evening were forced to flee from the city after suffering heavy losses. The self-propelled artillerymen pursued the enemy for about fifteen or seventeen

kilometers until he was hurled over another river barrier. Here, however, the Germans managed to blow up all but one railroad bridge. The artillerymen utilized it to attack the Germans once more. By midnight the Germans were pushed back so far from the city that they were unable to counterattack it any more.

The importance of speed and vigor in the joint operations of cavalry and self-propelled guns cannot be overemphasized. In situations such as the one described above, one must use all his forces to knock the enemy from the city as quickly as possible.

Delays are favorable only to the defending side. In this case no errors were committed, and the street fighting did not turn into a protracted engagement. The second task of the attacker—securing the city from counterattack by driving the enemy far away—was also accomplished very well due to the bold maneuver of the self-propelled batteries.

Let us note another essential detail which largely influenced the outcome of the battle for the city. Up to the last moment, the enemy had made extensive use of his bomber aviation based at a local airfield. In the latter part of the day, three self-propelled guns boldly approached the airfield and fired at it from a distance of 1,000 to 1,500 meters. Within a few minutes, five German bombers were set on fire while the remaining forty planes were forced to take off and fly to more distant airfields. As a result, enemy infantry was deprived of proper air support.

In spite of the fact that the tactical mobility of the cavalry in broken terrain is much higher than that of the heavy self-propelled artillery, close cooperation between the two arms is quite possible, even in pursuit. The slower the tempo of advance, the closer will be this cooperation. But even in a rapid advance, self-propelled guns can follow the cavalry without falling back if the route of their movement is provided with fairly reliable bridges and crossings. When cavalry advances very fast, the location of crossings for the heavy self-propelled (tank) units becomes a difficult task. These units should have attached sapper and ponton detachments which should accompany the artillery through the entire depth of their attack. Without this, the self-propelled (and tank) units will be unable to provide the cavalry with effective support; they will be delayed at each difficult natural barrier.

Planning for Combined Operations

From an article by Major P. J. MacCarthy, Royal Engineers, in *Aim*, army magazine of the British Middle East Command, No. 19, May 1944.

WHEN a formation has been earmarked for a combined operation, the various staff officers are sent on a special planning course to the Combined Training Center, and it is worth examining the problems which confront the experienced staff instructors during such a course.

Perhaps the formation is one which has already been well and truly tested on the field of battle and, in consequence, the ordinary planning for a land battle presents little or no difficulty. As yet, however, they have not had to deal with such matters as Loading and Landing Tables, priorities of stores and equipment, assault scales for a combined operation; all of which are very closely connected with the all-important governing factor—availability of ships and craft for the operation.

It is obvious, then, that in the early stages at least, an assault formation will have to land short of a certain amount of the personnel and equipment with which land warfare is normally waged. It is one of the many jobs of the Combined Training Center to guide the formation staffs in deciding what is to be taken by assaulting units and what is to follow later, and to assist them in the pruning process. Then comes the long and laborious job of compiling landing tables. Each indi-

vidual, each piece of equipment, however small, must be included and given a berth. For personnel, this is governed by the number of landing craft available in each assault ship, and for transport and equipment, by the number of motor transport and stores ships available.

At this stage we meet for the first time a very important and highly skilled officer and his staff—the Principal Military Landing Officer—attached to the formation as an expert and highly trained officer in the art of loading ships efficiently and economically. The Combined Training Center sets a problem and the staffs proceed to work out these Loading and Landing Tables.

The type of information we may expect to find is divided into two sections: No. 1—the personnel of the assault ships—the table will show code name of ship, code name of port of embarkation, time and date of embarkation, unit, numbers of officers, NCO's, and men, equipment to be carried, etc. Date and time of embarkation will, of course, have to be worked out in conjunction with the Naval Planning Staff, bearing in mind D-day, distance from sailing port to enemy beaches, speed of convoy, weather conditions, etc.

No. 2 type of Loading Table deals with motor transport and equipment to be landed after the initial assault waves have crossed the beaches and obtained a firm footing inland of the beaches. This Loading Table will show us once again the code names of ship and port of embarkation, time and date of loading of equipment, and so on. In addition, it will also contain exact measurements of all vehicles, guns, tanks, etc., and it is with this particular Loading Table that the Principal Military Landing Officer deals mostly. He is responsible for ensuring that all ships are so loaded that each item of equipment may be discharged in the correct order.

To illustrate what is meant by "tactical stowage," that term which has become a byword of combined operations, the following incident which occurred during preparations for a minor operation a year or two ago may serve as an example. The ship was loaded at a port in England by civilian labor, no doubt expert stevedores but completely ignorant of the meaning of "tactical stowage." The convoy put to sea, and shortly afterwards a check of the stowage plan was made and it was found that although the ack-ack guns to protect the landing beaches were accessible and could be discharged very early, the tractors for hauling them and the ammunition had been stowed at the bottom of one of the holds and, even with expert handling, could not be got at for at least six hours. Result—the whole convoy had to return to port and the ship be discharged and restowed under the expert eye of the Principal Military Landing Officer or his representative.

Now we come to the Landing Tables, and here we find worked out in the greatest detail the exact time of landing of each individual and each piece of equipment. As with the Loading Table, the Landing Table will show the code name of the ship from which the troops have to be ferried to the beaches, etc., but in addition, the table will also show the time at which the troops will assemble on board the assault ship, the time of lowering of assault craft, zero hour for landing on the beach, and the location of the actual beach itself. It will show the exact number of personnel to be carried in each craft and the wireless equipment necessary for ship-to-shore and shore-to-forward-troops communication in the early stages.

From the foregoing it will readily be appreciated just how much detailed calculation has to be done before all the information which goes to make up the Loading and Landing Tables becomes available, and how important it is that formation staffs have ample opportunity for practice and expert guidance in their compilation. This opportunity is afforded them during their stay at the Combined Training Center.

While still on the subject of planning, it is perhaps a good thing to emphasize once again the severe handicaps under which the assault troops have to operate, e.g., the platoon is cut down to twenty-eight men to allow room for the various specialists in the assault craft, and in the early stages the battalion will be required to operate with a

very small percentage of its normal motor transport.

In addition, the artillery support usual in land warfare is not available, and here we come to one of the greatest examples of close cooperation between Navy, Army, and RAF, where the Royal Navy and RAF step in and bridge the gap by bombardment of the enemy beaches and defenses until such time as the field artillery can land. This bombardment, as proved so many times in the past, is on highly scientific lines and here again its success is mainly due to trials and experiments ranging over a number of years.

One final word on the subject of combined training. When the Combined Training Center has done its job and the formations have been passed through, the whole operation is rehearsed under the guidance of a staff of experts whose job it is to simulate as nearly as possible the actual operation itself, and during the rehearsal to watch the various mistakes and pitfalls and bring them to the notice of the commanders.

One of the most important aspects of these exercises is that officers and men of all three services who are to take part in the operation are brought together in the same ships and craft in which they will do the actual operation. This is of the utmost importance as the value of personal contact before the operation and intimate knowledge of the ships and craft to be used cannot be overemphasized.

Tempos in Breakthrough Operations

Translated and digested at the Command and General Staff School from a Russian article by Lieutenant Colonel V. Pavlov and Major B. Korol in *Krasnaya Zvezda* (Red Star) 13 October 1944.

THE modern defensive position is deeply echeloned. The troops defending it, the system of fire, the obstacles, the fortifications, all are intended for a stubborn, meter-by-meter defense of the position. This means that the attacker should avoid any protracted combats in the main line of resistance, for *a fast tempo of movement is the basis of a successful breakthrough operation.* If the necessary tempo is not assumed from the very first moment of the offensive and if this tempo is not maintained throughout the battle, the enemy will generally succeed in recovering from the effect of artillery and aerial preparation and will continue to offer organized resistance. The idea of fast tempos should, therefore, underlie the entire plan of the operation, its preparation and organization as well as the action of each attacking echelon. The entire complicated mechanism of the operation should be so planned as to secure the fastest possible tempo of movement.

The utmost importance attaches to the rapid occupation of the first line of defense. Here the enemy concentrates his main forces, and his infantry fire is most intense. This line contains most of the antitank and antipersonnel obstacles and artillery observation posts. Deprive the Germans of the first position and you will disrupt the foundation of the entire defensive zone; you will strike at the enemy's main forces, automatic-weapon emplacements, and the most difficult obstacle area; you will also blind the hostile artillery during the initial phase of the breakthrough.

The first position must be overrun so quickly that the enemy is unable to withdraw his troops to the second position. Otherwise, the attack will have to be organized all over again.

When the first position is occupied, the troops immediately attack the second position and then destroy the artillery located beyond it. The destruction of enemy artillery observation in the first position blinds the enemy artillery only temporarily. It will continue to conduct observed fires as the attacking troops advance, and the quicker it is reached by the tanks and infantry, the sooner will the main force of the enemy fire system be destroyed.

In the Bobruisk operation, our troops broke through the five lines of trenches echeloned

to a depth of ten kilometers in one day, and the whole artillery strength of this zone was completely smashed by the end of the first day of the offensive.

Continuity of movement and of attacks is the most important prerequisite of the high tempo of the breakthrough. And here lies the secret of success.

Speed and continuity of advance are secured mainly by the simultaneous action of the attacker's fire means upon the entire depth of the defense with the concentration of the greatest effort on the main or first position. This requires a correct and definite distribution of missions among the various types of troops. Massed artillery and aviation help the infantry and tanks overcome rapidly the first and subsequent positions of the defense. This is attained by a simultaneous neutralization and destruction of enemy fire means and fortifications through the entire depth. The simultaneity of artillery and aerial action upon the entire depth of the hostile defense is the most important principle of breakthrough operations. This principle holds true for the artillery preparation phase and for the attack itself.

Infantry and tanks should immediately take advantage of the situation created by the neutralization of the entire depth of defense by artillery and aircraft. The attacking infantry echelon must not pause at all between the end of the artillery preparation and the beginning of the attack. This is attained by a *precise and well organized movement of the attacking echelon behind the moving barrage.* The infantry should stay close to the barrage, follow it persistently when it moves from the first trench to the second, and *use all the fire means at its disposal.* When the barrage leaves the first line of trenches, the infantry becomes the target of the weapons which have survived the artillery preparation. If the infantry fails to use, and use extensively, its own fire power, it may find itself separated from the barrage, and it will be necessary to bring it back to the first line of trenches.

Organic infantry tanks participate in breakthrough operations unless the terrain is unfavorable. When tanks and infantry work together, the cooperation, of course, becomes more complicated, but their combined action becomes more effective. The tanks *should follow the moving barrage together with the infantry in a skilful and organized manner,* and should be echeloned to enable the infantry *to assault simultaneously the nearest two or three trenches.* Enemy fire means located in the first and second trenches usually cooperate. If only the first trench is captured, the attackers may be subjected to a strong fire of the enemy's weapons in the second trench, where most of his infantry is usually located.

In order to facilitate the simultaneous assault on the first and second trenches, the tanks move in two echelons. The first echelon moves immediately behind the barrage; the second echelon follows it at the shortest possible distance, and is in turn followed by the first infantry echelon. *The smaller the depth of this formation composed of the barrage, attacking tanks, and infantry with close-support artillery, the better are the chances for a rapid advance, and for a simultaneous capture of both the first and second enemy trenches.* As soon as artillery fire is transferred to the second trench, the tanks should take possession of the first and be joined by the infantry. Should the barrage be shifted to the third trench, the tanks, closely followed by the infantry, rush to the second trench.

Smooth functioning of this cooperation depends largely upon *accurate and timely signalling for fire transfers.* These signals are given by the commander closest to the barrage. If tanks participate in the attack, the signal is naturally given by a tank officer.

All the details of cooperation in a simultaneous neutralization of the tactical depth of the defense during an attack by infantry and tanks should be worked out in advance. In other words, *the success of the cooperation is decided in the position of departure.* Delays, lagging behind, etc., inevitably lead to the collapse of cooperation, i.e., to a pause

disrupting the continuity and high tempo of the offensive.

In order to move ahead uninterruptedly, *not a single unnecessary minute should be spent in the trenches.* Tanks and infantry destroy only those forces which impede their movement. They are not supposed to clear the trenches of all the Germans. That is the task of the subsequent echelons. The main force of tanks and infantry destroys enemy manpower and matériel hampering their rapid advance and does it without halting. Delays in the captured trenches result in the loss of the tempo and in more difficult control of battle.

The ever-growing force of the offensive directly depends on the manner of commitment to battle of the second and subsequent echelons. The deep echelonment of the attacking infantry is calculated for the ever-increasing force of the attack, from its beginning to its successful completion. Consequently, the second echelons must prevent the slackening of the tempo, which happens very frequently at critical moments in the action of the first echelons. If, for example, the first echelon of a regiment, having reached the second trench, begins to weaken or show symptoms of weakening, the second echelon should immediately come to the rescue, complete the assault, and then rush the third trench. Commanders of units operating in subsequent echelons should carefully watch the battlefield and, in case of necessity, lead their troops on their own initiative to complete the attack of the first echelon if the latter shows symptoms of weakness.

Here, of course, arises the very difficult problem of cooperation, for the second echelon, without any pause or delay, is transformed from a *subsequent into a leading echelon* and suddenly becomes that link in the system of cooperation which was originally planned for the first echelon.

Experience shows that the depth of initial penetrations planned for regiments, divisions, and larger units in breaching fortified zones should be reduced. On the basis of actual experience, it is possible to state that this reduction does not slacken the tempo of the breakthrough, but on the contrary sharply accelerates it, creating a prerequisite for an energetic development of the whole operation.

Careful planning of cooperation measures in the position of departure is possible only when this is preceded by detailed reconnaissance. To play safe, the defensive zone to be attacked must be thoroughly studied. The Germans, for instance, are experts in building dummy positions. You may work out, for example, perfect cooperation for the breakthrough of the first position only to find out later that this is a dummy position. A tremendous amount of energy, forces, and means will be wasted. Everything, the artillery preparation and the attack, would have to be organized from the start. Such errors are inadmissible. We must try to avoid them by organizing careful reconnaissance, especially reconnaissance in force.

It should be taken into account that the enemy, discovering the concentrations of our troops, may withdraw his troops from the first position to the second. Hence the importance of concealed concentrations so well mastered by our troops. *The element of operational and tactical surprise is exploited in all the operations of the Red Army, and this explains why its initial blows are so powerful.*

Of particular importance to the success of our operation is the preliminary training of the troops. Cooperation among various arms and within units should be established in the course of their training. These exercises are organized in areas similar to the actual theater of the forthcoming offensive and equipped accordingly. During the preliminary exercises, infantry officers establish contact with the artillery and tank officers who are to participate in the actual breakthrough. Here the whole routine of cooperation, advance, and conduct of fire should be rehearsed in detail. The preliminary field training, in the course of which our troops were carefully prepared for breaching German defenses in all the past operations, was beyond doubt one of the most important factors in securing the high tempo and continuity of the offensive.

Therapy for Battle Exhaustion

From a British source.

IT is no news that the mental wounds inflicted by war are sometimes far more terrible in their lasting consequences than actual physical injury. A man without a leg or arm can still play a useful part in society. A man without a mind is a heavy burden both to himself, his family, and society.

In the last war there were few cures for war neuroses or battle exhaustion—then called "shell-shock." The development of the highly successful present-day treatments grew largely from experience gained at the time of Dunkirk and the Blitz.

The chronic neurotic is rare in the British Army, thanks to the careful weeding out at recruitment. But battle exhaustion can affect the nervous system of a first-class fighting man as surely as a bullet can affect his body.

It was discovered at the time of Dunkirk that rapid treatment in such cases was absolutely essential. Medical authorities noted the marked difference between casualties who had been treated immediately with sedative drugs and those left untreated for days or weeks. They cite, as example, the many cases who returned from Dunkirk apparently quite sound, but in reality suffering from nervous symptoms they did not want to report. The initial phobia, left untreated, developed into highly aggravated fears, and by the time treatment could be administered, instead of one comparatively simple phobia to cure, there were a half dozen others requiring harder, longer care.

Emergency sedation is now given as soon as the patient's condition is discovered, often quite near the field of action. Casualties (both mental and physical) are then sent back from the front to the transit hospital, which acts as a clearing station. Here all nationalities arrive mixed up together—Americans, Canadians, British—and all types of wounded, each with a label giving a preliminary field diagnosis. The American and Canadian cases are sent to their own hospitals. The medical and surgical cases are sorted out and given first aid and then moved on—within twenty-four hours, if they are not too severely injured—to base hospitals. The battle exhaustion cases are given more sedatives to keep them asleep until they can be passed back safely for further prolonged care.

Weight lost in battle must be regained before the soldier can be completely healed. While under sedation, patients are given insulin, which decreases blood sugar and enormously increases the appetite. They are then awakened every four hours and fed large meals. The combined method of quick, deep sedation and large feedings sends a good number of men back to their units fit and well in six days—a tremendous improvement over the months, even years, of patient treatment previously required.

In cases of loss of memory or inability to talk about some experience so terrible that it has become repressed within the patient, "truth drugs," more formally known as barbiturates, are often administered. These have somewhat the same effect on a man as too much alcohol. By degrees the patient becomes rather drunk, then talkative. He is in a relaxed, friendly state of mind. Skilful questioning and sympathy help bring the matter to the surface.

From the point of view of the knowledge gained in the treatment of war neuroses, and the effective use to which it has been put in all theaters by the medical corps of all the Allied armies, the sacrifices at Dunkirk and the Blitz are now contributing to our present medical as well as our military victories.

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